SEP 15

Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

SEPTEMBER 8, 1947
VOLUME 36, No. 18

AMERICAN DYESTUFF REPORTER

GREENVILLE PUBLIC LIBRARY

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

Ponsol* Red Brown RB Paste
(Pat.)

PONSOL Red Brown RB Paste is an economical reddening element for shading a wide range of lightfast vat browns on cotton and rayon. Its good tinctorial strength makes it useful for producing chocolate shades. Possesses very good fastness to light, washing, and chlorine . . . good resistance to peroxide bleaching.

Can be applied to yarns, piece goods or rawstock in the usual dyeing equipment. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Du Pont Dyestuffs

light fastness

medium shades, 40 to 300 hours

wash fastness

140° F. to 180° F.

fast dyes for nylon

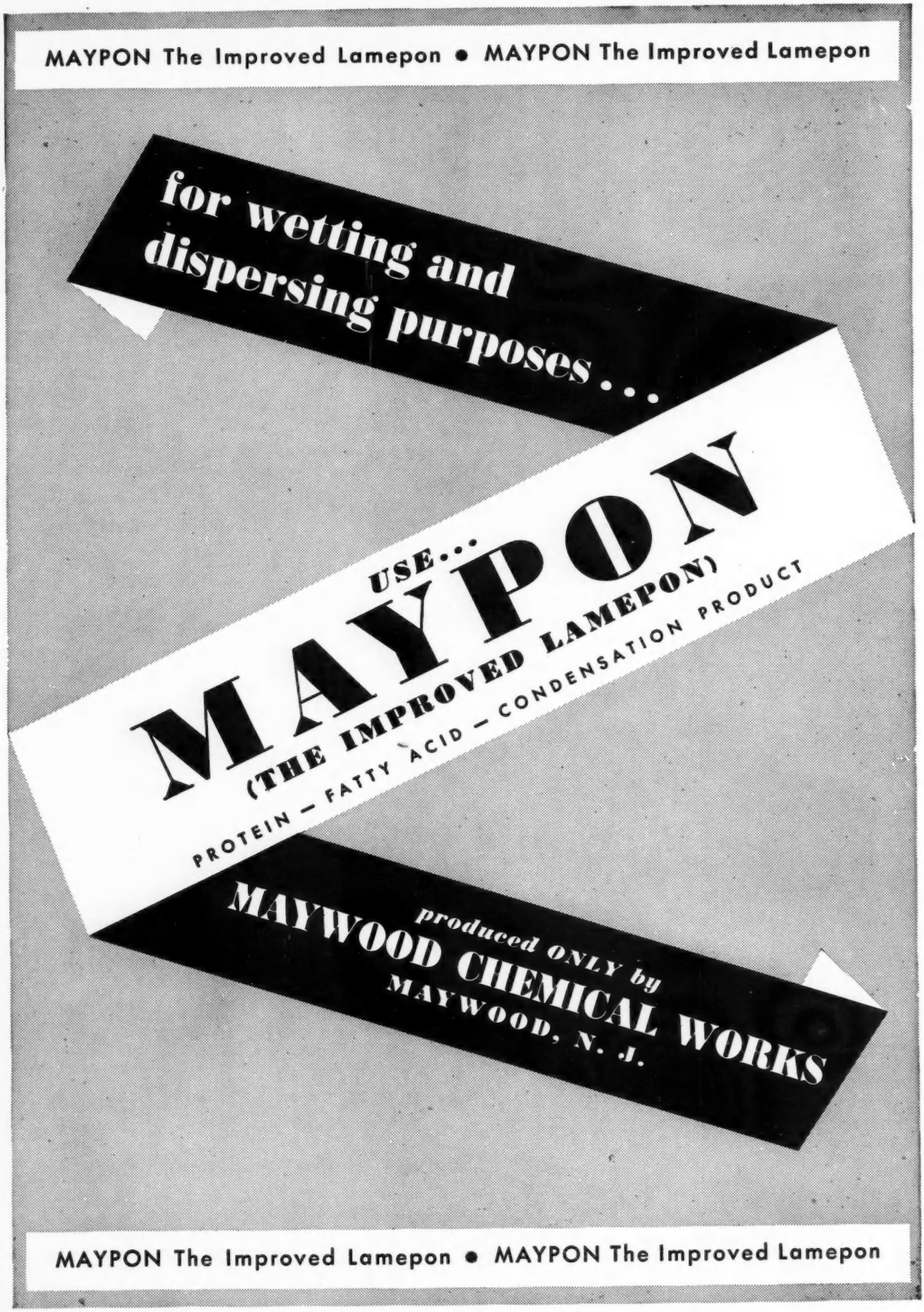
Dye Fast Unions on Nylon and Wool.
Dye Fast Unions on Nylon and Rayon or Cotton in combination with SUPER-LITEFAST direct dyes.

Extremely level dying in all percentages, for pastels and heavy shades on piece goods, yarns, etc.

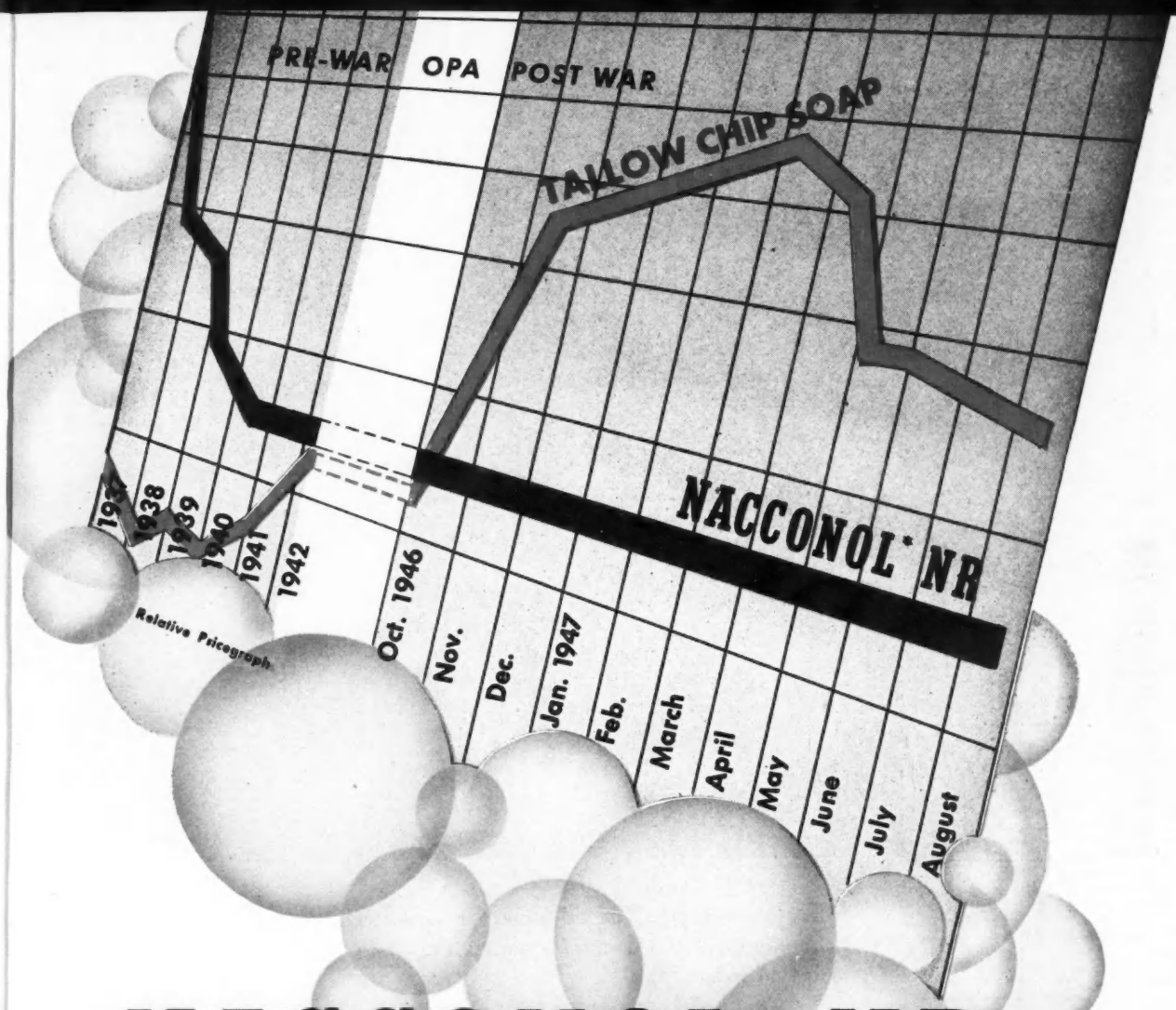
ALTHOUSE
Chemical Company
READING · PA.

INDANTHRENE UNSURPASSED IN FASTNESS TO SUNLIGHT AND WASHING

GENERAL DYESTUFF CORPORATION


MAYPON The Improved Lamepon • MAYPON The Improved Lamepon
for wetting and dispersing purposes . . .
USE . . .
MAYPON
(THE IMPROVED LAMEPON)
PROTEIN – FATTY ACID – CONDENSATION PRODUCT
produced ONLY by
MAYWOOD CHEMICAL WORKS
MAYWOOD, N. J.
MAYPON The Improved Lamepon • MAYPON The Improved Lamepon

American Dyestuff Reporter, Vol. 36, No. 18, Sept. 8, 1947. Published every other Monday. Copyright, 1947, by Howes Publishing Co., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00; Foreign, $6.00. Entered as second-class matter, Nov. 6. 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.



NACCONOL NR

AMERICA'S LEADING SYNTHETIC DETERGENT

COSTS LESS THAN SOAP
DOES MORE THAN SOAP

Additional production now available. Inquiries invited.

* Reg U.S. Pat Off

National Aniline DIVISION • ALLIED CHEMICAL & DYE CORPORATION

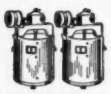
40 RECTOR ST., NEW YORK 6, N.Y. • BOSTON • PROVIDENCE • PHILADELPHIA • CHICAGO • SAN FRANCISCO • PORTLAND ORE GREENSBORO • CHARLOTTE • ATLANTA • NEW ORLEANS • CHATTANOOGA • TORONTO

You get Improved Quality, Unique Stability *in*

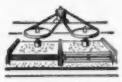
ALL EMERY RED OILS

Low-titre soaps

Typewriter ribbons . . . carbon papers

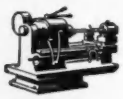


Metallic oleates . . . Esters



Flotation

Emulsifier . . . Polishes, disinfectants, oil and wax emulsions



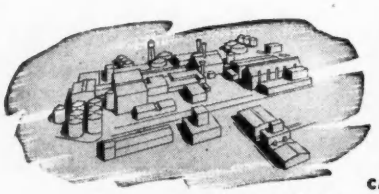
Lubricants . . . special greases

Current production of all Emery Elaines exhibit a marked improvement in all-around quality and stability. This will be noted in their . . .

- **Resistance to OXIDATION**
- **COLOR STABILITY**
- **Less tendency toward RANCIDITY**
- **ODOR STABILITY**

0-18 "ELAINE"*		0-20 WHITE "ELAINE"	
Titre	8-11°C	Titre	8-11°C
Iodine Value	90-93	Iodine Value	90-93
F.F.A. (as oleic)	97-99%	F.F.A. (as oleic)	98-100%
Acid No.	193-197	Acid No.	195-199
Sap. Value	195-199	Sap. Value	197-201
Unsap. (max.)	3.0%	Unsap. (max.)	2.0%
Color (Lovibond)	30Y-8R-1"	Color (Lovibond)	15Y-1.5R-5¼"

*"*Elaine*" is the trademark of all Emery Red Oils (oleic acids).*



EMERY INDUSTRIES, INC.

LIQUID FATTY ACIDS

CAREW TOWER • CINCINNATI 2, OHIO

3002 Woolworth Building
NEW YORK 7, N. Y.

187 Perry Street
LOWELL, MASSACHUSETTS

401 N. Broad Street
PHILADELPHIA 8, PA.

STEARIC ACID • OLEIC ACID • ANIMAL AND VEGETABLE FATTY ACIDS • TWITCHELL PRODUCTS • PLASTICIZERS

CHEMICAL USERS' GUIDE To General Chemical Company Products for the Textile Industry

PRODUCT	AVAILABLE FORMS	COMMERCIAL STRENGTH (MIN.)	SHIPPING CONTAINERS	APPLICATIONS
Glauber's Salt, Crystal $Na_2SO_4 \cdot 10H_2O$ *(Sodium Sulfate)*	Colorless Crystals	96% $Na_2SO_4 \cdot 10H_2O$ 42.3% Na_2SO_4	Bags Barrels	Dyeing assistant.
Glauber's Salt, Anhydrous Na_2SO_4 *(Sodium Sulfate)*	White Granules	99.5% Na_2SO_4	Bags Fibre Drums	Same as crystal but stronger product.
Sulfuric Acid H_2SO_4	Liquid	66° Be 93.19% H_2SO_4	Carboys Steel Drums Tank Trucks Tank Cars	Carbonizing wool; dyeing; desizing cotton; souring; rayon spinning bath.
Acetic Acid CH_3COOH + water	Colorless Liquid	Various	Carboys Barrels Tank Cars	Dye bath; souring agent; imparting scroop to cotton and silk.
Aqua Ammonia NH_4OH + water *(Ammonia)*	Colorless Liquid	26° Be 29.4% NH_3	Carboys Steel Drums	Wool scouring; dyeing.
Hydrochloric Acid HCl + Water *(Muriatic Acid)*	Liquid	22° Be 34.1% HCl	Carboys Tank Cars Tank Trucks	Souring; removing hypochlorite bleach; dyeing.
Tetrasodium Pyrophosphate, Anhydrous $Na_4P_2O_7$ *(TSPP) (Pyro)*	White Powder	98% $Na_4P_2O_7$ (Equiv. 52% P_2O_5)	Bags	Stabilizing peroxide bleaches; water treatment and dispersing agent; detergent.
Sodium Metasilicate $Na_2SiO_3 \cdot 5H_2O$	White Granules	29.0% Na_2O	Bags Fibre Drums	Kier boiling as detergent.
Sodium Sulfide Na_2S + water	Red Chips or Solid Mass	60% Na_2S	Steel Drums	Dyeing with sulfur dyes; depilatory for wool pulling; desulfuring rayon.
Sodium Sulfite, Anhydrous Na_2SO_3 *(Sulfite)*	White Powder	98.5% Na_2SO_3	Bags Fibre Drums	Rayon manufacturing.
Sodium Bisulfite, Anhydrous $Na_2S_2O_5$ *(ABS) (Sodium Metabisulfite)*	White Powder	97.5% $Na_2S_2O_5$ (Equiv. 65.5% SO_2)	Fibre Drums	Bleaching wool; anti-chlor after bleaching with hypochlorite; rayon manufacturing.
Oxalic Acid $C_2H_2O_4 \cdot 2H_2O$	Colorless Crystals	99.5% $C_2H_2O_4 \cdot 2H_2O$	Fibre Drums	Bleaching; dyeing; for mordanting wool with chrome.
Ferric Sulfate $Fe_2(SO_4)_3$ + water *(Iron Copperas Nitrate)*	Liquid	47° Be 11% Fe	Carboys Barrels	Silk weighting; mordant.
Ferric Nitrate $Fe(NO_3)_3$ + water *(Iron True Nitrate)*	Liquid	43° Be 47° Be 10% Fe 11% Fe	Carboys Barrels	Silk weighting; mordant.

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

OTHER PRODUCTS: Disodium Phosphate; Nitre Cake; Sodium Silicate; Trisodium Phosphate; Sodium Hyposulfite; Aluminum Sulfate; Lead Acetate; Mixed Acid; Epsom Salt; Chrome Alum; Aluminum Chloride; Ammonia Alum; Potash Alum; Ammonium Sulfate.

FOR THE LABORATORY OR SPECIAL APPLICATIONS: BAKER & ADAMSON REAGENTS and FINE CHEMICALS

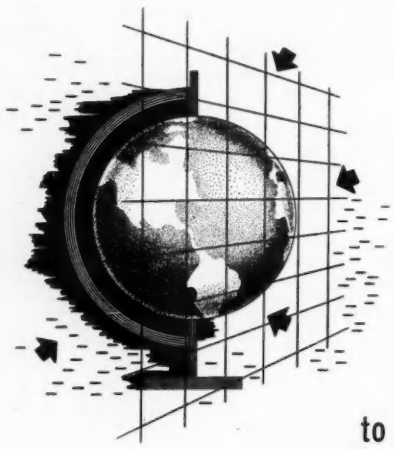
GENERAL CHEMICAL COMPANY

40 RECTOR STREET • NEW YORK 6, N. Y.

Sales and Technical Service Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Portland (Ore.) • Providence San Francisco • Seattle • St. Louis • Wenatchee & Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver



Spin the Globe...

There's a FALLEK Representative Everywhere!

Here is your opportunity to secure World Wide Distribution for American Dyestuffs ...

READ THESE FIGURES!

92% of the world's total exports in Coal-Tar Colors, Dyes and Stains were supplied by Europe to the rest of the world.*

4.6% of the world's total exports in Coal-Tar Colors, Dyes, and Stains were supplied by the United States to the rest of the world.*

With foreign production at a minimum level, now is the opportune time for American Suppliers to secure a solid foothold in the most lucrative overseas markets . . . and here is how FALLEK can help you:

FALLEK ... eliminates costly credit risks. *You receive your check when your goods are ready for shipment* . . . as simple as a domestic transaction, but larger profits.

FALLEK ...creates an acceptance for your products throughout world markets that assures continuous business.

FALLEK ... gains you the proper entree with leading firms of known responsibility.

FALLEK ... gives you intelligent, daily sales coverage through representatives located in every world market.

FALLEK ... means permanence, through long established outlets in Europe, Latin America, and the Orient.

FALLEK ... saves you the detail handling and numerous expenses of operating an export department.

FALLEK ... brings you men of wide experience, men highly skilled in the problems of world distribution ... plus skilled technicians in every foreign office fully equipped to render all the technical information necessary to users of American Dyestuffs.

American dyestuffs for textiles, leather, paper, etc., are in urgent demand throughout the world. You can realize a sizeable share of this business by making FALLEK your foreign selling agents. THIS is the time to safeguard profits against the hazards of "buyer's market" or a falling off in domestic demand, by developing a substantial export volume. FALLEK can do this for you.

**U. S. Tariff Commission Report No. 19 last pre-war figures 1946*

WRITE, WIRE OR PHONE FOR FURTHER INFORMATION.

FALLEK PRODUCTS COMPANY, INC.

165 BROADWAY • NEW YORK 6, N. Y.

SPECIALISTS IN ORGANIC CHEMICALS

NEUTRONYX 330

OTHER USES

- Auxiliary Detergent for Hard Water Conditions
- Dispersing and Solubilizing Agent for Acetate Colors
- Scouring Assistant for Rayon and Acetate
- Assistant in Chlorination of Wool in Shrinkproofing
- Dispersing Agent for Pigments in Organic Vehicles

PROPERTIES

Neutronyx 330 is a reddish brown oily liquid readily miscible with water and with alcohol. It contains an anhydrous polyalkyl ether condensate of fatty acids.

It is compatible with moderate concentrations of acids and alkalies and with hard water, electrolytes and both anionic and cationic surface-active agents. It disperses insoluble anionic-cationic complexes. Soluble in both water and organic solvents.

It is stable to heat and has perfect stability in both normal plant use and in storage.

PERFORMANCE

Surface Tension (Dynes per Cm.)
DuNouy Tensiometer (25°C.)

Concentration	Dynes
0.5%	34.5
0.1%	35.2
0.01%	35.4

Wetting Action (Draves Test)

Concentration	25°C.	60°C.
0.5%	215 Sec.	27 Sec.
0.2%	5 Min. Plus	56 Sec.
0.05%	"	170 Sec.

Detergency

Hunter Reflectometer with standard soiled cotton before and after washing.

Concentration	Per Cent
0.1%	13.5
0.05%	11.9
With addition of 0.25% TSPP	
0.1%	22.8
0.05%	15.0

Non-Ionic Surface-Active DETERGENT AND EMULSIFIER *With Unusual Dispersing Action*

NEUTRONYX 330 offers exceptional usefulness in detergent, emulsifying and dispersing action with the outstanding advantage of stability against hardness, electrolytes and both anionic and cationic surface-active agents. It prevents redeposit of suspended soil on fabrics and does not adsorb on any textile fibers. It is particularly useful in improving penetration and levelling of acid, acetate and direct dyes. It is in extensive use as an assistant to insure more even exhaustion of anionic and cationic hosiery finishes.

Relatively non-foaming, Neutronyx 330 is an excellent wetting agent in warm solution.

We will be glad to send complete data.

onyx

CHEMICALS FOR DYEING AND FINISHING

Onyx Oil & Chemical Company

JERSEY CITY 2, N. J.

CHICAGO · PROVIDENCE · CHARLOTTE · ATLANTA · LOS ANGELES

In Canada: Onyx Oil & Chemical Co., Ltd. Montreal, Toronto, St. Johns, Que.

For Export: Onyx International Jersey City 2, N. J.

The FINISH is the Payoff!

In the race for sales, too, the finish is everything. Hosiery . . . and other textile products . . . must have that thoroughbred appearance to be "in the money."

For specialized chemicals—water repellents, mildew-proofings, etc.—as well as standard oils or finishing materials, you'll find that FANCOURT quality and personalized attention to your problems will help you take—and keep—the lead.

Try Resin B and Nyatex for beautifully finished nylons. Reduce handling damage; add sales appeal

W. F. FANCOURT & CO.

PHILADELPHIA, PA.

In the South, Howard A. Virkler, Greensboro, N.C.

Solving Finishing Problems Since 1904

DEVELOP YOUR COLORS WITH U. S. P. SOLVAY SODIUM NITRITE

The secret of quality azo dyes

SOLVAY
TRADE MARK REG. U. S. PAT. OFF.
SODIUM NITRITE
(U. S. P.)

To insure quality azo dyes, leading textile manufacturers specify U.S.P. grade SOLVAY Sodium Nitrite to develop their colors.

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 Rector Street **New York 6, N. Y.**

BRANCH SALES OFFICES:

Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • St. Louis • Syracuse

NYANZA

ANILINE & ALIZARINE COLORS

•

TEXTILE CHEMICALS

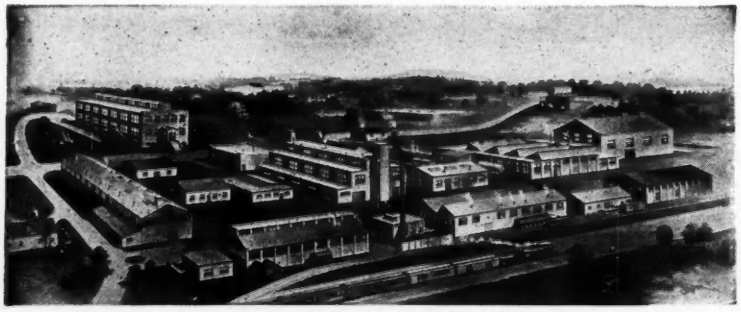
•

FINISHING MATERIALS

FOR

WOOL—COTTON—RAYON—ACETATE

AND MIXED FIBERS



FACTORY AT ASHLAND, MASSACHUSETTS

NYANZA COLOR & CHEMICAL COMPANY, Inc.

215 WATER STREET NEW YORK CITY

FACTORIES:

CHEMICAL MANUFACTURING CO., ASHLAND, MASS. • NEW BRUNSWICK CHEMICAL CO., NEWARK, N. J.

BRANCHES:

ASHLAND, MASSACHUSETTS

549 West Randolph St., Chicago, Ill. • 635 Drexel Bldg., Philadelphia, Pa. • 115 S.W. Fourth Ave., Portland, Ore.

2657 Magnolia Ave., Knoxville, Tenn. • 304 E. Moorehead St., Charlotte, N. C.

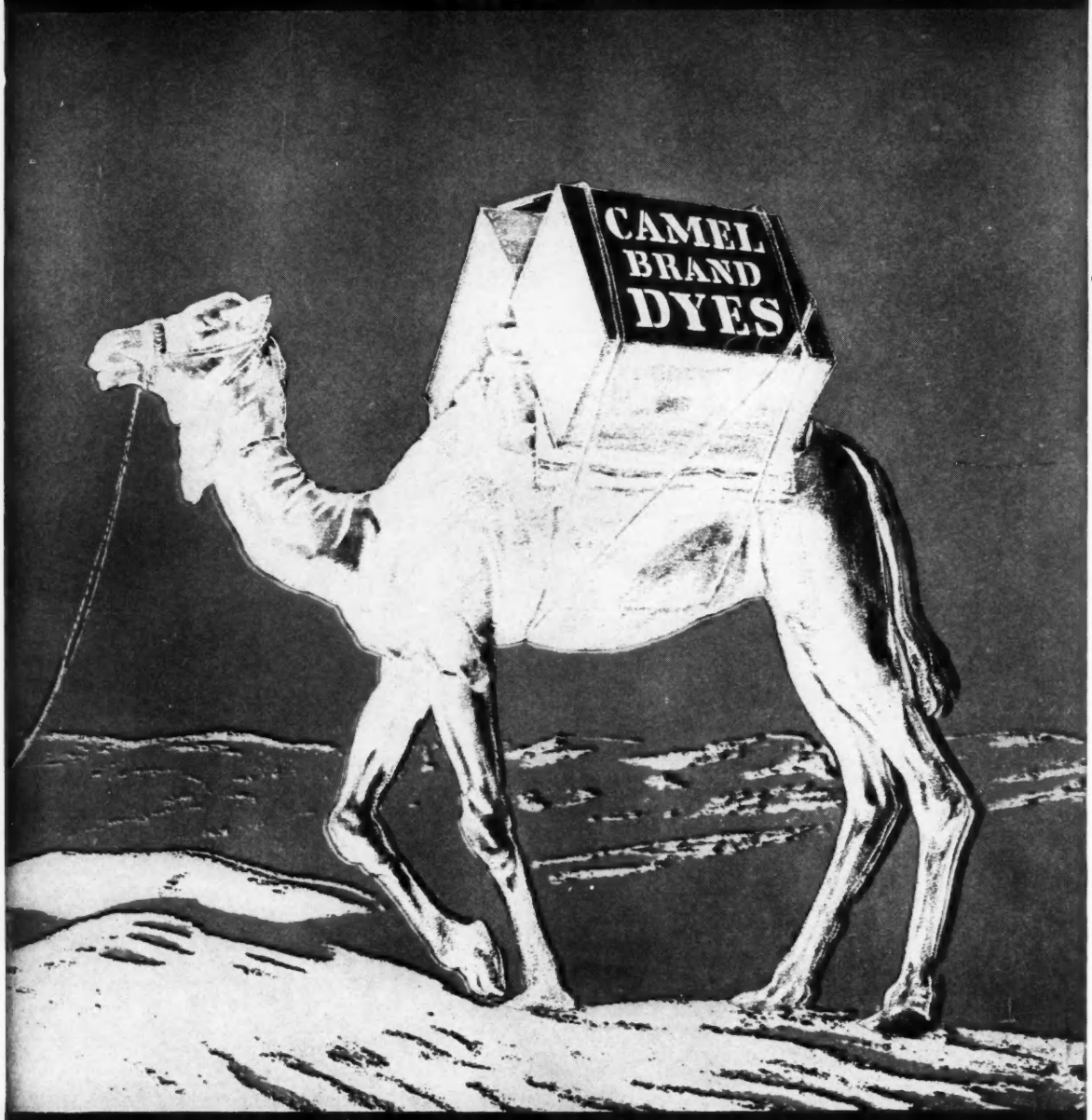
CANADIAN AGENTS:

Charles Albert Smith Limited, 123 Liberty St., Toronto, Canada

Stymied for Results?
use CALCOGENE* Sulfur Dyes
CALCOGENE Sulfur dyes give exceptionally good results in the dyeing of rayon raw stock to be blended with wool. They are excellent, also, for use on cotton-rayon blends to produce blue and green elements on Scotch plaids.
The CALCOGENE group embraces a wide range of low-cost sulfur dyes. Their superior wash-fastness recommends them for work clothes fabrics, sports apparel and for coverts, ticking and ginghams.
Your CALCO representative will be glad to advise you on the many varied applications of CALCO sulfur dyes. CALCO CHEMICAL DIVISION, AMERICAN CYANAMID COMPANY, Bound Brook, New Jersey.
New York, Chicago, Philadelphia, Boston, Charlotte, Providence.
*Trademark
Calco
Reprints of this advertisement suitable for framing and without text will be sent on request.

QUALITY DYESTUFFS

SINCE 1878



JOHN CAMPBELL & COMPANY, INC.

75 HUDSON STREET • NEW YORK CITY

TELEPHONE: BArclay 7-6228-6229

PHILADELPHIA: BROAD AND SPRING GARDEN STS.

BRANCH OFFICES AND WAREHOUSES:

BOSTON EAST CLEVELAND, OHIO ATLANTA, GA.

HOW WOULD YOU PRINT THIS PATTERN ON BEMBERG SHEER?

Executives of Supreme Textile Printers, Inc., knew that in printing Bemberg sheers by conventional methods there is always the danger of cracking the fabric. Therefore, to produce this gay, sporting design, they decided to use one of the new low-crock Aridye* Pigment Colors. Here's how they did it.

The fabric was first dyed a chartreuse shade and overprinted with Aridye Black FK 4214 cut 1:1 with Aridye Clear 6130. Then the fabric was merely dried and cured for 3 minutes at 300°F. No ageing, soaping, or other after-treatment was necessary.

Results: An eye-catching print with fine, delicate lines in a rich, bloomy black. No cracking or other damage to the fabric; no impairment of the hand. Excellent fastness to commercial pre-spotting and dry-cleaning.

Because of their many advantages, Aridye Pigment Colors are being used more and more by leading printers of cotton, rayon, and other fabrics. Interchemical technical representatives are trained to help *you* solve your unusual printing problems and improve your everyday printing jobs. Write to Interchemical Corporation—Textile Colors Division—*pioneers in pigment colors for textiles*—P.O. Box 357, Fair Lawn, N.J.

*Reg. U. S. Pat. Office

CHECK THESE EIGHT ADVANTAGES

Sharpness of Mark • Exceptional Fastness to Sunlight
Uniformity of Shade • Fastness to Washing
Bright Colors • Economy
Ease of Application • No Impairment of Hand

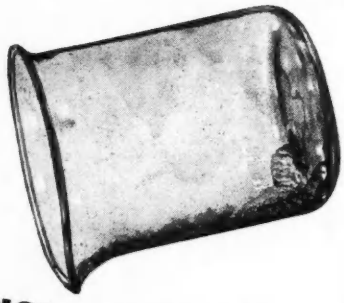
Aridye *Pigment colors*

INTERCHEMICAL CORPORATION • TEXTILE COLORS DIVISION • FAIR LAWN, N. J. • ROCK HILL, S. C. • PROVIDENCE, R. I.

FEWER REDYES
FEWER SECONDS

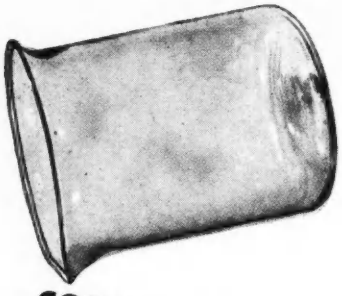
WITH NEW INTERCHEM ACETATE DYES

Because Interchem* Acetate Dyes are colloidized during manufacture they are highly dispersible. When pasted with water, they disperse rapidly and completely, leaving no undispersed particles. For this reason there is virtually no danger of dye specks, and time-consuming, costly redyes and seconds are cut to the minimum.



NOT COLLOIDIZED

To beaker of hot water add ½ ounce of any acetate dye. Stir for 30 seconds, and pour off contents. If small dye granules are left in the beaker, dispersion has been incomplete and "specking" might result from use of the dye.



COLLOIDIZED

Now try the same test with an Interchem Acetate Dye. Note that no dye granules are left when beaker is emptied. Their absence proves the high degree of dispersibility of the colloidized Interchem Acetate Dyes.

Interchem Acetate Dyes are suitable for dyeing acetate rayon and nylon on jigs or boxes. They are useful for producing both self shades and compound shades. Interchem Acetate Dyes promote level dyeing, give more consistent results from dye formulas, make possible better color-matching control. They have good pile on. They do not tar at high temperatures. Some Interchem Acetate Dyes are suitable for ground shades for discharge printing or for application printing.

Interchem Acetate Dyes are now available in blue, red, rubine, bordeaux, yellow, and orange. Others will be ready soon.

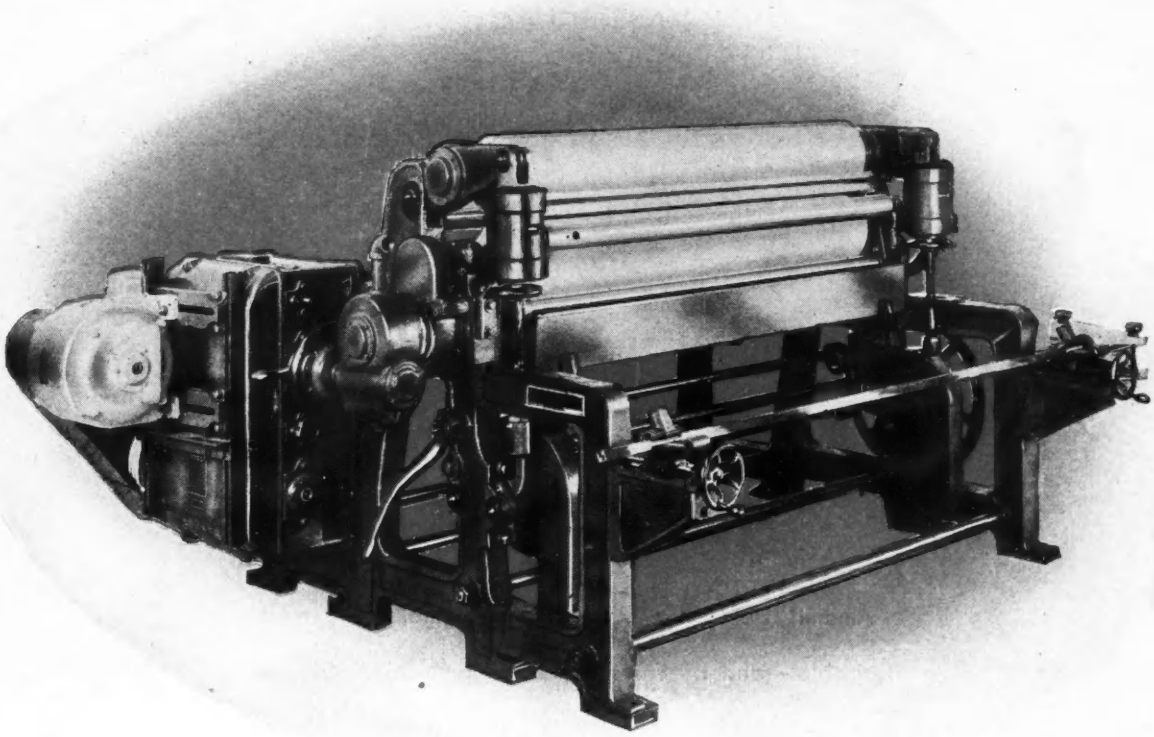
An Interchemical technical service man will be glad to discuss with you where and how you can benefit from the use of Interchem Acetate Dyes. For samples and full information, write to Interchemical Corporation—Textile Colors Division, P. O. Box 357, Fair Lawn, New Jersey.

PIGMENT COLORS

REG. U.S. PAT. OF

*Trade Mark

INTERCHEMICAL CORPORATION • TEXTILE COLORS DIVISION • FAIR LAWN, N. J.
ROCK HILL, S. C. • PROVIDENCE, R. I.



V. V. HEAVY DUTY QUETSCH - PADDER

Now is the time to replace obsolete two-roll quetsches with this new quetsch-padder. It is heavier in all respects. For example: it gives you up to three tons' pressure at the nip, instead of less than a ton given by old machines.

This new quetsch-padder is used as an individual machine for applying finish or when placed in front of dry boxes, tenters or Palmer tenters for dyeing or other wet treatment.

Instead of lever pressure—pressure system is air, hydraulic or spring, as desired by purchaser. Transmission is variable speed type. Solution pan is made of stainless steel. Rolls are rubber covered and entire machine is designed and manufactured for rugged service.

VAN VLAANDEREN MACHINE COMPANY

370 Straight St., Paterson 3, New Jersey • Cable Address: VLAANDEREN, PATERSONNJ. U.S.A.

World's largest manufacturer of machines for processing modern fabrics

There is **no** longer a ***scarcity*** of

AMANIL* DEVELOPER BON

in the ***required amount,*** for users of

SRA* BLACK GS

Amanil* Developer BON is the original — the most desirable — and by far the most economical developer of its kind found on the market today.

Should you be averse to using Caustic Soda in dissolving the developer BON and prefer a simplified method of developing this black, then may we suggest the use of

BONASOL*

instead, a product which is available for prompt delivery to users of SRA* Black GS.

AMERICAN ANILINE PRODUCTS, INC.
50 UNION SQUARE, NEW YORK, N. Y.
Plant: Lock Haven, Pa.

Branches: Providence, R. I. • Philadelphia, Pa. • Chattanooga, Tenn.
Boston, Mass. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Dominion Anilines & Chemicals Ltd. • Toronto, Can. • Montreal, Can.

*Reg. U. S. Pat. Off.

"In my business, we could use more caustic soda, soda ash and sodium bicarbonate than we're getting . . . and that goes for liquid chlorine, too. But at least we know where we stand. Mathieson took the trouble to explain the whole story to us—why there's a shortage of these important heavy chemicals . . . what to expect in the way of increased supplies in 1947 and 1948. Mathieson always works with us . . .

. . . and that's why we like to do business with Mathieson!"*

**The foregoing is based on reactions to our advertisement—"Why you can't buy all the Caustic Soda, Soda Ash, Sodium Bicarbonate and Chlorine you want"—which appeared in many publications earlier this year.*

The Mathieson Alkali Works (Inc.),
60 East 42nd Street, New York 17, N. Y.

Mathieson
CHEMICALS

Caustic Soda . . . Soda Ash . . . Sodium Bicarbonate . . . Liquid Chlorine . . . Chlorine Dioxide . . . Ammonia, Anhydrous & Aqua . . . HTH Products . . . Fused Alkali Products . . . Dry Ice . . . Carbonic Gas Sodium Chlorite Products . . . Sodium Methylate

Keep Textiles on the Upswing with Hooker Chemicals

"Textiles on the Upswing" headlines an article in a recent issue of BUSINESS WEEK—and the reason for this upswing—"Most buyers, finding that the new cloth was of good quality, ordered more."

Smart textile buyers buy quality. And that goes for buyers of chemicals, too. Dye and textile chemists who want to keep textiles on the upswing by maintaining their high quality standards will find dependable allies in Hooker chemicals. Some of the Hooker chemicals used in the dye and textile industries are listed below. Technical Data sheets and samples will be sent when requested on your company letterhead.

PRODUCT	FORMULA	DESCRIPTION	SUGGESTED USES
Acetyl Chloride	CH_3COCl	Clear, colorless to pale yellow liquid.	Manufacture of acetyl derivatives, dye and organic intermediates.
Aluminum Chloride Anhydrous	$AlCl_3$	Gray crystalline solid.	Catalyst in synthesis of dyestuffs and intermediates.
Antimony Trichloride Anhydrous	$SbCl_3$	Yellowish crystalline solid.	Catalyst in organic syntheses. Mordant.
Benzoate of Soda	C_6H_5COONa	White crystalline solid.	Intermediate for manufacture of dyes.
Benzoic Acid	C_6H_5COOH	White crystalline solid.	Manufacture of dyes. Mordant.
2,5-Dichloraniline	$Cl_2C_6H_3NO_2$	Brown crystalline solid.	Dyestuff intermediate.
2,5-Dichlornitrobenzene	$Cl_2C_6H_3NH_2$	Tawny colored granular material.	Intermediate in synthesizing azo colors and other dyes.
Orthodichlorbenzene	$C_6H_4Cl_2$	Clear, colorless liquid.	Solvent, dye intermediate.
Sulfuryl Chloride	SO_2Cl_2	Light yellow liquid.	Chlorinating agent. Forms chlorides and anhydrides of organic acids.
Thionyl Chloride Refined and Technical	$SOCl_2$	Pale yellow to red liquid.	Chlorinating agent. Forms organic acid chlorides.

HOOKER ELECTROCHEMICAL COMPANY

2 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
New York, N. Y. Wilmington, Calif. Tacoma, Wash.

7-341

HOOKER CHEMICALS

Caustic Soda **Chlorine** **Muriatic Acid** **Sodium Sulfide** **Sodium Sulfhydrate**

A dye beck in the year 1820 — *Courtesy J. B. Lippincott Co.*

The dyer of 1820 was limited to the use of *natural* dyestuffs.

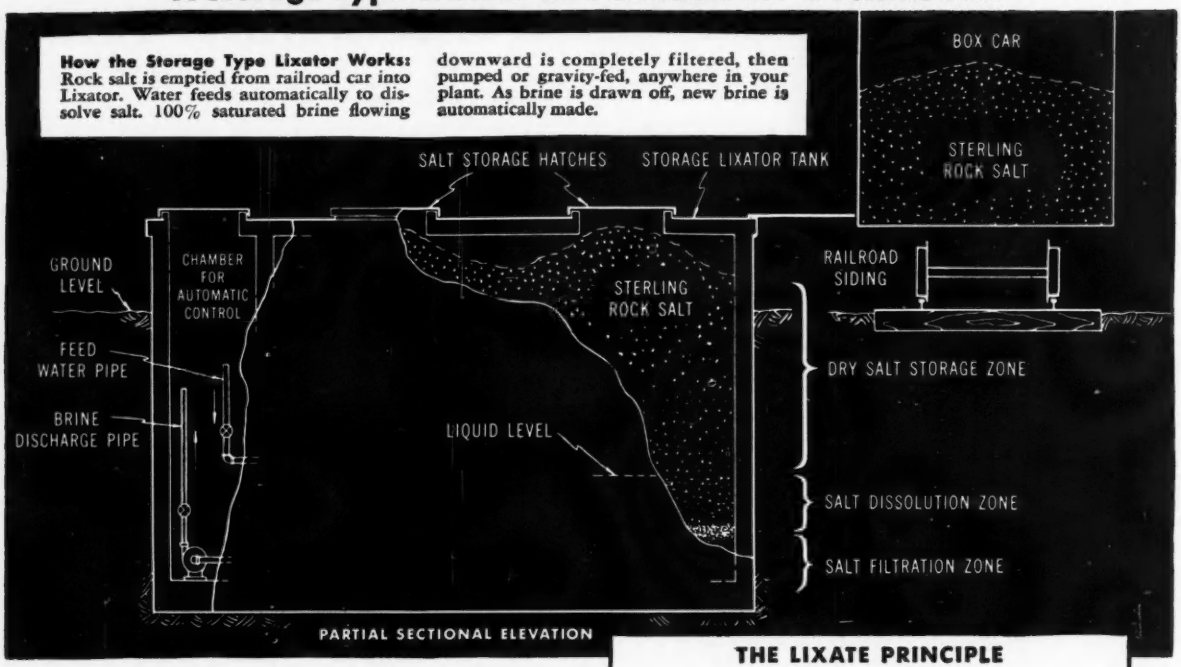
The first practical, *synthetic* dyestuff appears to have been prepared in 1856. This was followed by an era of significant progress in the textile industry.

In utilizing *modern* dyestuffs, today's dyers are aided by Rapidase. This product of Wallerstein Research assures rapid and consistently effective de-sizing of cottons, rayons and mixed goods over a wide range of temperatures.

RAPIDASE

WALLERSTEIN COMPANY, INC. **180 Madison Ave., New York 16, N. Y.**

A Storage Type Lixator Unit Suitable for a Textile Mill


How the Storage Type Lixator Works: Rock salt is emptied from railroad car into Lixator. Water feeds automatically to dissolve salt. 100% saturated brine flowing downward is completely filtered, then pumped or gravity-fed, anywhere in your plant. As brine is drawn off, new brine is automatically made.
BOX CAR
STERLING ROCK SALT
SALT STORAGE HATCHES
STORAGE LIXATOR TANK
GROUND LEVEL
CHAMBER FOR AUTOMATIC CONTROL
FEED WATER PIPE
BRINE DISCHARGE PIPE
STERLING ROCK SALT
LIQUID LEVEL
RAILROAD SIDING
DRY SALT STORAGE ZONE
SALT DISSOLUTION ZONE
SALT FILTRATION ZONE
PARTIAL SECTIONAL ELEVATION

DAN RIVER MILLS' Storage Type Lixator Produces 8000 Gallons of Saturated, Filtered Brine per hour

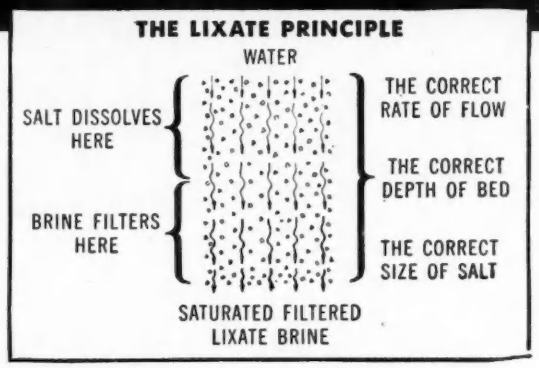
"It Paid for itself in One Year"

Says W. B. CARROLL,
Superintendent of Dyeing

Once, salt had to be handled *eight different times*—even before it was dissolved by hand labor into brine—at Dan River Mills, Riverside Division, Danville, Va.

Today, Sterling Rock Salt is unloaded from railroad cars into an 8000-gallon-per-hour Storage Type Lixator right beside the tracks. From the Lixator, 100% saturated, clean, crystal clear, self-filtered brine flows automatically by pipe to the nearby stock dyehouse... *and 3,700 feet across the Dan River to the suiting dyehouse.*

The entire installation paid for itself within a year, thanks to operating economies made possible by the expertly designed, International Storage Type Lixator.



With long years of experience behind them in cooperating with the textile industry, International engineers are thoroughly familiar with the uses of salt as brine in dyeing machines and vats and for regenerating zeolite water softeners. In every use the Storage Type Lixator eliminates salt handling and waste. Its brine making capacity always equals your needs. It is a completely automatic system, delivering the exact quantity of brine required at every point of use.

Full details of how the Storage Type Lixator can save you man-hours and money and boost your production efficiency will gladly be furnished. Simply fill out and send the attached coupon.

INTERNATIONAL SALT COMPANY, INC.
Dept. ADR-9, Scranton, Pa.
Gentlemen:
I would like complete information about the Storage Type Lixator.

*Name*_____

*Firm*_____

*Street*_____

*City*_____ *State*_____

The LIXATE *Process*
Reg. U. S. Pat. Off.
for making brine
INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

cotton and linen processing

APPLICATION	EFFECT
RAW STOCK—	
Carding	Reduce fly — wetting
Dyeing	Leveling, wetting
Kier boiling	Wetting, dispersing, scouring
Oiling	Wetting, ease removal
Scouring	Cleansing
WAYS—	
Bleaching	Wetting to increase uniformity
Dyeing	Leveling, protective colloid
Enzyme desizing	Wetting, dispersing
Scouring	Cleaning
Sizes	Penetrant
Slashing	Wetting, ease removal
Wetting out	Wetting, increase processing quality and speed
WOVEN GOODS—	
Absorbency	Improvement for towels, face cloths, mops
Dyeing	Wetting, leveling
Kier boiling	Wetting, dispersing, scouring
Flame proofing	Wetting, penetrant
Mercerizing	Wetting
Sanforizing	Wetting
Shrinksetting	Wetting
PACKAGE AND SKEIN GOODS—	
Conditioning	Wetting
Dyeing	Wetting, leveling
Scouring	Cleansing
Wetting out	Wetting
Wet twisting	Wetting

Santomerse No. 1

for Penetration • Wetting out Scouring (cleansing)

Santomerse No. 1 finds wide appeal in the textile industry, as shown in the table of applications for cotton and linen processing. Santomerse No. 1 not only possesses the requirements for penetration, wetting out and scouring (cleansing), but, in addition, is stable to acid, alkali and hard water; forms soluble metallic salts, rinses quickly without insoluble deposit. The protective surface action exerted by Santomerse No. 1 makes it a desirable additive to dye baths, because of its leveling effect.

SANTOMERSE No. 1 IS SIMILARLY USEFUL IN PROCESSING OPERATIONS FOR RAYON, SILK, NYLON AND WOOL

For further details on the application of Santomerse No. 1 to the textile field, send for your copy of Monsanto's new Application Data Bulletin No. P-118. Contact the nearest Monsanto District Sales Office, or write to MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal. *Santomerse: Reg. U. S. Pat. Off.*

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Lanascour

DREW'S NEW WOOL SCOURING AGENT

Combines the well-known advantages of soap with the most desirable qualities of synthetic detergents.

LANASCOUR **was developed on specific suggestion from leading wool processors**

FOR GREASE WOOL SCOURING
YARN SCOURING
BACK WASHING TOP
PIECE GOODS WASHING

A perfectly balanced compound

Mill Demonstrations Solicited

E. F. DREW & CO., INC.

15 EAST 26th STREET • NEW YORK 10, N. Y.

• FACTORY & LABORATORIES: BOONTON, N. J. •

CANADA	BOSTON	GREENVILLE, S.C.	CHICAGO	BRAZIL
E. F. Drew & Co., Ltd. Montreal	Chamber of Commerce Bldg., Zone 10	805 Woodside Bldg., (New Southern Office)	919 N. Michigan Ave., Zone 11	E. F. Drew & Cia., Ltd. Rio De Janeiro

Artistry in Chemistry

VELVAMINE K-90

An improved softening and finishing agent for use on all types of fabrics. It imparts an odorless finish which is resistant to washing and dry cleaning. Can be used as a substitute for sulphonated oils, tallows and other softeners. Its use eliminates yellowing and rancidity often encountered with the usual fatty type of softening agents.

PERMALENE SOL

A penetrant and cleanser designed for use on all fabrics especially those that are tightly woven and highly twisted. Recommended for pad-dyeing where it insures uniform and thorough penetration. It is of great assistance where low temperature dyeings are necessary. Non-foaming at high speeds, it is stable in neutral, alkaline and acid solutions.

VELVAMINE GF

Velvamine GF is a blend of amines and softeners designed to protect acetate colors from gas or fume fading. It resists removal by drycleaning and, when used on mixed fabrics, has a minimum effect on the shade and light fastness of the direct colors. Velvamine GF produces a soft, full hand and does not affect the appearance of the treated fabrics.

PERMALENE WS

A white powder soluble in water at 80° F. Capable of dispersing iron, calcium and magnesium salts and redissolving or re-dispersing precipitated compounds of these metals. It is so highly buffered that the pH of its solution is practically independent of its concentration.

REFINED PRODUCTS CORPORATION

LYNDHURST • NEW JERSEY

• Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I.
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Col Company, 82 Wall St., New York City.

IMPORTANT TRADE NOTES

Wide Range of use is Big Feature of Indigosol Golden Yellow IGK

THE present price of Indigosol Golden Yellow IGK makes possible the use of this very fast Indigosol for economical dyeing and printing operations.

In combination with Indigosol Green IBA, very fast green shades are now available to the printer and dyer for the first time at a very reasonable cost.

An excellent printing color on cotton and rayon, it is also of great interest to the dyer of cotton, rayon and wool.

In ease of application, the perfectly level shades obtained, and the unusually excellent penetration of heavy goods makes the entire line of INDIGOSOLS especially valuable to the fast color dyer or printer.

Brightness and Economy are Characteristics of Pharmasol Golden Yellow N

PHARMASOL Golden Yellow N produces clear, bright, fast and economical golden yellow shades when printed on cottons or rayons.

When mixed with Pharmasol Red RN, a complete range of Gold Shades can be obtained.

PHARMASOLS are solutions of stabilized azoic dyes and adjusted to the most practical concentration which can be easily applied with a maximum of efficiency.

PHARMASOLS solve the problem of troublesome dissolving and the uncertainties thereof—and as there is no decomposition there can be no loss of material or value.

CARBIC COLOR AND CHEMICAL CO., INC.
451-453 Washington Street, New York City

BRANCHES:
PHILADELPHIA
PROVIDENCE HAMILTON, ONT.
CHARLOTTE, N. C.

IMPORTERS OF THE MANUFACTURES OF
DURAND & HUGUENIN S. A.
BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF
PHARMASOLS
PHARMOLS
PHARMACINES

Representative: Los Angeles (Hathaway Allied Products)

AMERICAN DYESTUFF REPORTER

LOUIS A. OLNEY, D.Sc
Directing Editor

NORMAN A. JOHNSON, B.T.C.
Managing Editor

MYRON D. REESER
Advertising Manager

GRACE B. BURTON
Production Manager

M. H. MORGAN
Circulation Manager

Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

Published every other Monday by
HOWES PUBLISHING COMPANY, INC.
One Madison Avenue, New York 10, N. Y.

A. P. HOWES
President

C. R. HOWES
Vice President

H. F. CRAWFORD
Treasurer

M. D. REESER
Secretary

C. ESSENBREIS
Asst. Secretary

Also Publishers of
KNIT GOODS WEEKLY
TEXTILE COLORIST
AND CONVERTER

September 8, 1947

VOLUME 36 NUMBER 18

Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Special Articles

Integration of Sciences in Textile Research..... 510
S. Jack Davis

• Departments

Abstracts from Contemporary Journals..... 509

Patent Digest 512
Paul Wengraf

Trade Notes—New Products..... 514

• Proceedings of the American Association of Textile Chemists and Colorists

Intersectional Contest
The Tippy Dyeing of Wool and its Control..... P486
New York Section

Papers, Committees, Speakers and Judges Announced for Intersectional Contest..... P506

Calendar P507

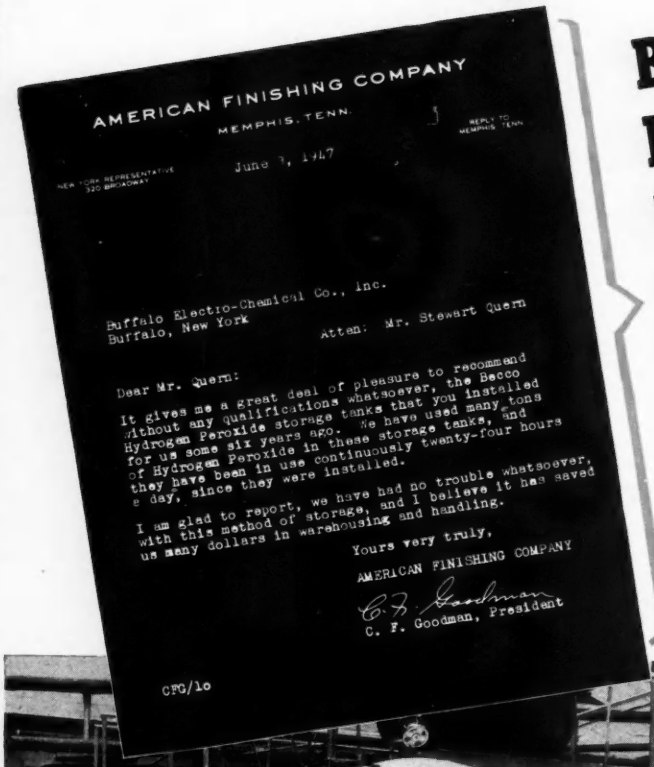
Employment Register P508

Dr. Stiegler to Speak at Piedmont Meeting..... P508

Annual Outing, Mid-West Section..... P508

To Intensify Study on Ageing of Textiles..... P508

Copyright, 1947, Howes Publishing Co., Inc.



AMERICAN FINISHING COMPANY

MEMPHIS, TENN.

NEW YORK REPRESENTATIVE 320 BROADWAY

REPLY TO MEMPHIS, TENN.

June 3, 1947

Buffalo Electro-Chemical Co., Inc.
Buffalo, New York

Atten: Mr. Stewart Quern

Dear Mr. Quern:

It gives me a great deal of pleasure to recommend without any qualifications whatsoever, the Becco Hydrogen Peroxide storage tanks that you installed for us some six years ago. We have used many tons of Hydrogen Peroxide in these storage tanks, and they have been in use continuously twenty-four hours a day, since they were installed.

I am glad to report, we have had no trouble whatsoever, with this method of storage, and I believe it has saved us many dollars in warehousing and handling.

Yours very truly,

AMERICAN FINISHING COMPANY

C. F. Goodman

C. F. Goodman, President

CFG/lo

BECCO HYDROGEN PEROXIDE "...to recommend, without any qualifications whatsoever..."

The American Finishing Company is only one of Becco's distinguished customers who use, with complete satisfaction, Becco Hydrogen Peroxide in bulk shipments.

We invite your consultation with us...at no obligation, of course ...on your particular requirements.

BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL COMPANY, INC.

BUFFALO 7, NEW YORK

New York Boston Philadelphia Chicago Charlotte

Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1947, American Association of Textile Chemists and Colorists

September 8, 1947

National Officers of the Association

President
HENRY F. HERRMANN
General Dyestuff Corp., 435 Hudson Street, New York 14, N. Y.

Vice-Presidents
C. NORRIS RABOLD
Union Bleachery, Greenville, S. C.
JOHN N. DALTON
Pacific Mills, Lawrence, Mass

Treasurer
WILLIAM R. MOORHOUSE
National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston 14, Mass.

Secretary
HAROLD C. CHAPIN
Lowell Textile Institute, Lowell, Mass.

President Emeritus and Chairman of the Research Committee
LOUIS A. OLNEY
Lowell Textile Institute, Lowell, Mass.

Director of Research
HAROLD W. STIEGLER
Lowell Textile Institute, Lowell, Mass.

COUNCILORS
Representing Sections

Rhode Island: HOWARD V. KING, HAROLD B. STURTEVANT, RALPH F. CULVER.

Philadelphia: CURT R. BAERINGER, LLOYD O. KOONS, ARTHUR W. ETCHELLS, BOYCE C. BOND, PERCIVAL THEEL.

New York: PATRICK J. KENNEDY, LEONARD S. LITTLE, THOMAS F. O'BRIEN, GEORGE L. BAXTER, EMMETT J. DRISCOLL, WINN W. CHASE, HAROLD H. TAYLOR.

Northern New England: EDWARD S. CHAPIN, WALTER J. HAMBURGER, DELBERT E. RAY.

Piedmont: SIDNEY M. CONE, RAPHAEL E. RUPP, LELAND G. ATKINS.

Southeastern: WILLIAM B. GRIFFIN.

South Central: ANDREW J. KELLY

Mid-West: ERIC W. CAMP, SAMUEL KLEIN.

Past Presidents

ELVIN H. KILLHEFFER, P. J. WOOD, WILLIAM H. CADY, ALBAN EAVENSON, CARL Z. DRAVES, THOMAS R. SMITH, WILLIAM D. APPEL.

Standing Committees of the Council and their Chairmen

Executive Committee on Research
J. Robert Bonnar, Chairman

Publicity
Winn W. Chase, Chairman

Conventions
Kenneth H. Barnard, Chairman

Appropriations
William R. Moorhouse, Chairman

Constitution and By laws
Harold C. Chapin, Chairman

Membership and Local Sections
John N. Dalton, Chairman

Corporate Membership
Emmett J. Driscoll, Chairman

Publications
Louis A. Olney, Chairman

Technical Programs
Miles A. Dahlen, Chairman

Local Sections and their Officers

Northern New England Section

Chairman
George O. Linberg, Monsanto Chemical Co., 140 Federal Street, Boston 10, Mass.

Secretary
Axel W. Mack, Dexter Chemical Corp., 581 Boylston Street, Boston 16, Mass.

Vice-Chairman: Frank J. O'Neil
Treasurer: Martin H. Gurley, Jr.

Rhode Island Section

Chairman
George H. Wood, Jr., 40 Valentine Circle, Apponaug, R. I.

Secretary
Emory A. Richards, Airedale Worsted Mills, Inc., 928 Park Ave., Woonsocket, R. I.

Vice-Chairman: Robert W. Joerger
Treasurer: Robert R. Farwell

New York Section

Chairman
Herman E. Hager, General Dyestuff Corp., 435 Hudson Street, New York 14, N. Y.

Secretary
Norman A. Johnson, American Dyestuff Reporter, One Madison Ave., New York 10, N. Y.

Vice-Chairman: Charles W. Dorn
Treasurer: John H. Hennessey

Philadelphia Section

Chairman
Walter Fancourt III, W. F. Fancourt & Co., 516 S. Delaware Ave., Philadelphia 47, Pa.

Secretary
A. E. Raimo, John Campbell & Co., S. E. Corner Broad and Spring Garden Sts., Philadelphia 23, Pa.

Vice-Chairman: Arthur M. Gordon
Treasurer: James Dixon

Piedmont Section

Chairman
Wyss L. Barker, National Aniline Division, Allied Chemical & Dye Corp., P. O. Box 659, Charlotte 1, N. C.

Secretary
Robert H. Smith, Melrose Hosiery Mills, High Point, N. C.

Vice-Chairman: John B. Neely
Treasurer: Roy J. Beauregard

South Central Section

Chairman
Jack Anderson, Peerless Woolen Mills, Rossville, Ga.

Secretary
Charles A. Spratt, National Aniline Division, Allied Chemical & Dye Corp., Chattanooga, Tenn.

Vice-Chairman: William J. Kelly
Treasurer: Robert J. Quigg

Mid-West Section

Chairman
Al. J. Feit, E. I. duPont de Nemours & Co., Inc., 7 S. Dearborn Street, Chicago, Ill.

Secretary
George B. Chabot, Jr., Calco Chemical Division, American Cyanamid Co., 146 W. Kinzie Street, Chicago, Ill.

Vice-Chairman: George E. Osha
Treasurer: Joseph H. Jones

Southeastern Section

Chairman
A. Kempton Haynes, Rohm & Haas Co., Inc., 1811 Meadowdale Ave., N. E., Atlanta, Ga.

Secretary
Howard M. Waddle, West Point Mfg. Co., Shawmut, Ala.

Vice-Chairman: Matthew T. Barnhill
Treasurer: Allyn J. Morse

Student Chapters

Lowell Textile Institute
North Carolina State College
Philadelphia Textile Institute
New Bedford Textile Institute
Georgia School of Technology

Members should notify the Secretary immediately of all address changes

Intersectional Contest—First Prize Winner—

The Tippy Dyeing of Wool and its Control*

Presented by the NEW YORK SECTION

COMMITTEE
Werner von Bergen, *Chairman*
Dr. Hugo Ehrhardt
Claude Clutz
Daniel P. Knowland
Henry E. Millson
Shannon Mooradian
Arthur N. Patterson
Harold S. Dahlberg
William A. Holst
Dr. Hans Luttringhaus
Advisory Committee
Paul J. Luck
Dr. Herman E. Hager
Speaker
Henry E. Millson
Judge
Emmett J. Driscoll

Abstract

The validity of the statement that colloidal dyestuffs dye tippy wool fibers less level than molecular types is questioned, and it is shown that the property of level dyeing on tippy wool is not necessarily related to the degree of aggregation of the dye.

Coloristic evidence is presented to confirm the existence of rupture in the sulfur linkage in the wool epidermis damaged by sunlight. It is shown also that relinking of the cysteine side chains does not prevent tippy dyeing.

A table is given of the properties of most acid and chrome dyes currently in use, with reference to the dyeing of tippy wools and mohair. This table, based on more than 4,500 dyeings, has been prepared for practical use in the woolen industry.

A study of leveling agents based on both laboratory dyeings and mill runs has demonstrated that tippiness can be overcome by the use of proper leveling agents.

A selection of color plates, chosen from some 200 Kodachrome slides taken in the course of this investigation, are given to illustrate the results obtained.

Introduction

WOOL is a naturally heterogeneous animal fiber, and for this reason may exhibit extreme variations in its affinity for dyes of all kinds. Too often the dyer experiences difficulties in producing a uniform shade because of the manner in which the dye is absorbed by the fiber. An ideal dyeing is one in which all of the dye is distributed equally and uniformly among all of the fibers present. However, this is rarely if ever attained in practice, and instead distinct differences in shade and depth of color are obtained on the same fiber or fleece (Fig. 1, 2, 3, 4, 5, 12). Previous studies [1] have shown that certain dyes, such as Calcocid Orange Y Ex. Conc. (C. I. 151), will penetrate and dye most fibers uniformly regardless of their physical and chemical condition as shown in (Fig. 9, 10, 11, 21, 22 and 23). Other wool dyes, such as Calcocid Amaranth Extra, (C.I. 184), level more slowly and exhibit definite variations in absorption, as seen in (Fig. 13, 14 and 15). Most milling dyes produce extreme fiber selective results (illustrated in Fig. 17, 18 and 19) when applied by the customary methods for milling types. These variations in affinity for dyes are inherent in each fiber, and are in part the result of unequal exposure to sunlight, weather and other agencies while the wool is growing on the sheep. Such differences in affinity for dyes result in what is called "tippy dyeing", and present one of the most baffling problems confronting the wool dyer.

Tippy dyeing occurs in several forms, the first and most serious being those dyeings in which the tips of the fibers are heavily dyed while the body sections remain undyed or only lightly dyed. (Fig. 29, 30, 31, 32). A second and less troublesome effect is caused by the tips remaining undyed or lightly dyed while the body portions are heavily dyed. (Fig. 25, 26, 27, 28). Other variations are obtained when two or more contrasting colors are used to produce a shade, resulting in pronounced differences in hue and color value between the tips and body portions. (Fig. 3, 6, 7, 8). The presence of these extreme contrasts is less apparent when the stock is carded and combed, but skittery, frosty, or heathery effects are obtained which result in weaker shades. For many years the woolen industry has recognized tippy dyeing as a major problem, and a number of attempts have been made to reduce or eliminate its effects. Corrective methods, suggested by von Bergen,[2], Westbrooke[3], Speakman and co-workers [4, 5, 6, 7, 8, 9, 10], and recently O'Day [11] are limited in their effectiveness and have not found widespread application. The need for minimizing or eliminating tippiness has greatly increased in the past few years due to the consumers demand for materials of higher quality and levelness of shade. The problem has been increased further by the greater proportions of foreign wools now in use.

Due to the practical inadequacies of previous recommendations this problem was selected as a basis for intensive study by members of the New York section of the AATCC and as a result of extensive cooperative laboratory and dyehouse research, improved and practical corrective measures have been developed. The Committee is confident that the new and more complete data made available by this study will enable the mill dyer to obtain more uniform results in practice.

Tippy Dyeing

The first scientific study of tippy dyeing was conducted by von Bergen [2] over twenty years ago. He established that this characteristic is caused by the action of sunlight and weather on the wool fibers during their growth on the sheep. He showed that whereas parts of the fleece taken from the back and shoulder dye unlevel, those from the belly dye uni-

* Presented at Intersectional Contest, Silver Jubilee Convention, Boston, Mass., December 13, 1946.

formly. Von Bergen recognized two types of tippy dyeing. In the first type, designated as negative, the tip or exposed portion of the fiber dyes considerably lighter than the body part, as in the case of indigo applied from a hydrosulfite vat. In the second type, designated as positive, the tip dyes much darker than the body part, as typified by Anthracene Chrome Brown SWN dyeings by the top chrome method.

The occurrence of either type of tippy dyeing, or of fiberwise level dyeing, depends upon the particular dye applied and also to some extent upon the method of application. Dyes which normally yield level fiber dyeing are referred to in this paper as ideal dyes.

In general, negative dyeings are the less objectionable, since the greater part of each fiber is colored, and therefore a minimum of difficulty is experienced in shade matching. In dyeings exhibiting the positive effect, however, most of the dye is absorbed by a small portion of each fiber near the tip, leaving most of the fiber undyed or lightly dyed, and making shade matching virtually impossible. This difficulty is further intensified in the application of dye combinations, especially where positive, negative, and ideal dyestuffs of contrasting shades are used together. For example, the effect of a positive red and a negative blue is illustrated in (Fig. 3). The degree of tippiness varies also with the origin of the wool. In Australian stock the effect is usually more pronounced than in domestic wools, probably indirectly due to differences in the density or compactness of the fleece. In the high density Australian fleeces, the extent of damage due to light is generally limited to the outermost or tip portions of the fibers, whereas, in the less dense domestic fleeces light damage may affect as much as half the staple length.

As mentioned previously, the action of sunlight on the wool fiber is responsible for changes in its affinity for dyes. The chemical change or damage sustained by the wool substance has been described by Smith and Harris[12] and by McMahon and Speakman[13] as photo-chemical reactions involving a breakdown in the disulfide linkage. The analyses of these authors revealed the loss of about 14% of the total sulfur in the tip portion under the influence of light, corresponding to the hydrolysis of 28% of the disulfide bonds present. The most important physical evidence of change observed under the microscope is a deficiency or total loss of scales, with increased swelling of the fiber in the dyebath. These changes have been observed and described by Georgeievics, Allwoerden, and von Bergen. According to Speakman[14] this defect alone would lead to unlevel dyeing with most dyes, and especially with collodial dyes, because the scale structure of normal wool fibers offers considerable resistance to penetration. Further evidence of the physical change due to sunlight has been shown[1] in microscopical comparisons of longitudinal and cross-sectional views of the damaged tips and the undamaged body ends of such fibers. Marked differences in surface fiber structure and in the penetration of dye are noted.

Studies on Colloidal and Crystalloidal Dyes

According to Speakman[4] the destruction of disulfide bonds in exposed portions of the fiber causes greater swelling, with increased absorption of colloidal dyes and decreased absorption of the crystalloidal types. He describes a method of pretreatment with basic chromium acetate to form linkages between the peptide chains and thereby to obtain level dyeings with certain acid and chrome dyestuffs. Experiments in the present study, however, have shown that this pretreatment does not produce dyeings free from tippiness in the case of many dyes rated poor or medium in table III.

In order to investigate the level-dyeing behavior of colloidal and non-aggregating dyestuffs on tippy wool, a study was carried out with Alizarine Cyanine Green G and Alizarine Cyanine Green GHN, both C.I. 1078. It was found that the Green GHN (neutral dyeing type) produces dyeings either free from tippiness or showing a slightly negative effect, while the Green G (acid dyeing type) yields strongly positive tippy dyeings, although both dyes are of the same color index number and are chemically similar. These same effects were also found with Alizarine Fast Grey BBLW and Alizarine Fast Grey BLN (Pr. 206); the Gray BBLW (acid dyeing type) producing tippy dyeings and the Gray BLN (neutral dyeing type) little or no tippiness. The relative states of aggregation were investigated also by the comparison of transmission curves of solutions of the dyes in water and alcohol. In all cases there is a "sharpening" of the curves obtained with alcohol, indicating the probability of a lesser degree of aggregation in this solvent. The difference between the water and alcohol curves for Alizarine Cyanine Green GHN is much larger than for Alizarine Cyanine Green G, indicating the greater aggregation of Alizarine Cyanine Green GHN in aqueous solution. See (Fig. 49 and 50). This difference is large for both Alizarine Fast Gray BBLW and BLN, both being largely aggregated and essentially to the same degree. (Fig. 51 and 52).

Studies of the dependence of aggregation upon temperature were carried out with aqueous solutions of the four dyes mentioned above. These solutions were circulated from a reservoir through a thin optical cell (thickness approximately 2mm), first at room temperature (25°C.) and also at 50°C. and 90°C. The spectral transmission curves obtained are shown in (Fig. 53 and 54). From these curves it is seen that in the cases of Alizarine Cyanine Green G and Green GHN, the main absorption band at 90°C. is displaced 10-12 mu toward shorter wavelengths with respect to its position at room temperature. The effect is somewhat greater for Alizarine Cyanine Green GHN than for Alizarine Cyanine Green G, presumably because of greater aggregation of the Green GHN at room temperature. In the same manner, while a comparatively large temperature effect was found for both Alizarine Fast Gray BBLW and BLN, as shown in (Fig. 55 and 56), little difference is observed between them.

Further series of experiments to determine the comparative state of aggregation were conducted by several methods:

a) "Beer's law deviation", or changes in conditions on changing concentration by a factor of 10.
b) Behavior on adding Peregal 0, which modified and stabilizes the dye solution, presumably by an approach to the unaggregated condition.
c) Effect of magnesium and aluminum salts.
d) Effect of aluminum salts after adding Peregal 0.

Photometric experiments were also made to determine the scattering effect caused by the relative colloidal aggregation of these four dyestuffs. An aqueous solution of each dye (0.1 gm/liter) was kept at 90°C. for one hour and then cooled to room temperature. A beam of light from an unfiltered mercury lamp (H_4) was passed into the dye solution contained in a rectangular cell, and the intensity of scattered light in a direction at right angles to the incident beam was measured with a photoelectric photometer. The intensity of light scattered by the Green G solution was 0.24 and that of the Green GHN solution 0.89, relative to the scattering of light by the pure solvent taken as unity. (Both dye solutions not only scattered light, but strongly absorbed it. The two solutions were characterized by comparable values of absorption.) Upon addition of 1 gm magnesium sulfate per liter of dye solution (at room temperature), the scattering of Green GHN increased to almost twice its original value

within five minutes, while that of Green G increased by less than ten per cent. The intensity of scattering, in the two cases, as a function of time after addition of magnesium sulfate, is shown in Figures 57 and 58.

In all of these experiments the level dyeing Alizarine Cyanine Green GHN appeared to be aggregated in solution to a greater degree than Alizarine Cyanine Green G, which produces tippy dyeings. In the case of the Alizarine Fast Grays, it was shown that both types are very highly aggregated, with Alizarine Fast Gray BLN exhibiting slightly greater aggregation than the Gray BBLW. While both types exhibit approximately equal degrees of aggregation, however, Gray BLN dyes wool level while Gray BBLW produces tippy results. These results are not in accord with the Speakman hypothesis, but indicate that the degree of aggregation of a dyestuff is not necesarily related to its properties of level dyeing on tippy wool.

Townend[15] distinguishes between level and tippy dyeing dyestuffs on the basis of sulfonation, stating that whereas tippy dyeings are obtained with polysulfonated dyestuffs, monosulfonates produce level dyeings. While this appears to be true in many cases, certain exceptions of both types may be cited, particularly among the polysulfonated types. In regard to the monosulfonates, two or three dyes (according to the Colour Index) namely Alizarine Rubinol 3G (C.I. 1091), Fast Acid Violet 10 B (C.I. 696), and Patent Blue AF (C.I. 714), dye tippy. However, among the polysulfonated types a number of dyes are known which dye perfectly level or which can be rated medium in tippy dyeing properties. For instance Fast Light Yellow 2G (C.I. 639), and Fast Light Orange 2G (C.I. 27), are examples of polysulfonated types which dye tippy wool perfectly level.

Previous studies [16, 17] have shown that color value on materials dyed with a given percentage of dye diminishes rapidly as the number of undyed or lightly dyed fibers increased. Conversely, therefore, the reduction of tippiness will increase color value. Further, the fastness to light of dyed goods decreases with the number of lightly dyed fibers in the blend. A heavy level shade may have excellent fastness to light, but if the dye is distributed unevenly among the fibers, the fastness to light of such a blend will show premature fading since the lightly dyed fibers lose their color in a comparatively short time. The same holds true in regard to fastness to washing and fulling.

Prediction of Tippiness in Wool

Durings this investigation, a simple test was developed for the determination of tippy dyeing tendencies of a given wool. An average sample of 10 to 25 grams of the scoured fleece or raw stock is treated at 120°F. for 15 minutes with 3% Calcomine Fluorescent Violet 2G and 2% sulfuric acid—liquor ratio 1-50. The sample is then rinsed, dried and examined in ultra-violet light. The inexpensive Purple X ultra-violet lamp is very satisfactory for this purpose, and shows the fluorescent tips better than most other ultra-violet sources.

If stock dyed in this manner shows brightly fluorescent tips and non-fluorescent body parts, (Fig. 16, 20, 24) tippy dyeing may be expected. This may be demonstrated with a dye such as Acid Anthracene Brown PG (Pr. 4), first marking the brilliantly fluorescent areas and then dyeing with Brown PG. All fluorescent parts dye more heavily than the non-fluorescent areas.

The Control of Tippy Dyeing Wools

Many dyes, commonly known as "level dyeing" types in ordinary practice, can be used to give level shades without any difficulty. Well-known examples are Amido Napthol Red 6B (C.I. 57) and Wool Green S (C.I. 737). Other types, for examples Fast Red A (C.I. 176) and Alizarine Sky Blue B (C.I. 1088), do not readily dye level. It might be expected that dyes known to be level dyeing ought to be useful in overcoming tippiness in wool, but experiments with the above four dyes show that this is not the case. The Red 6B and the Green S produce very tippy dyeings, while Fast Red A and Alizarine Sky Blue give dyeings which are quite uniform fiberwise. The dyer is therefore unable to apply his knowledge of "level dyeing" properties of dyes with success in avoiding tippy results.

1. Selection of Dyes

As a basis for the development of methods of control of tippy dyeing, a broad study was made of the behavior of dyes currently in use, in the absence of any assistants or pretreatments intended to reduce tippiness.

In order to permit a practical approach to this problem in the dyehouse, the behavior of a large number of dyestuffs was studied on wool known to produce tippy effects. This investigation included more than 650 dyes and 4,500 dyeings, made in accordance with the procedures outlined below. From these results it was possible to rate each dye in terms of its sensitivity to tippiness in wool, and this information is presented in Table III. The use of this table will enable the dyer to obtain improved results by the proper selection of dyes rated for their tendency toward tippiness. It should prove of particular value in the production of shades requiring a combination of dyes, since the proper selection of dyes will eliminate pronounced differences in hue between body and tips.

Laboratory Procedures

A. Selection of Wools: Based on practical experience three commercially important fibers were chosen for experimental study. These types, selected because of their well known tendency to dye tippy, were Australian wool, South American wool, and kid mohair. A sufficiently large stock of each was scoured by usual mill procedure, and then divided into equal portions for use in the various laboratories. The main characteristics of these types is given in Table I.

B. Dyeing Methods: In order to insure utmost accuracy and correlation of the experimental data secured in the four cooperating laboratories, prescribed dyeing methods and techniques were adopted universally and followed without deviation. Wherever it was believed that the degree of purity of certain chemicals might cause a variation in results, these were either specified as to grade and manufacture, or portions from the same lot were supplied for use in all laboratories. It was also agreed to include acid, milling, metalized, and chrome dyes in the study, to provide data of maximum utility and scope. Each of the cooperating dyestuff laboratories prepared dyeings of all dyes of its own range and manufacture. In cases where prototype dyes were found in the ranges produced by the four companies, each used its own product. The dyeing procedures adopted are given in detail below. In all cases a fiber to liquor ratio of 1:60 was used. In each dye trial, a 5-gram sample of the dry scoured stock was wet out for 15 minutes in water at 140°F., and squeezed to remove the excess. Dyeing was started at 110°F. and the

TABLE I
Analysis of Wool Samples

Type	*Australian*	*South American*	*Mohair*
Grade	64's	36/40's	32's
Average Diameter	22.0μ	38.4μ	33.6μ
Ether Extract	0.67%	0.82%	0.72%
Alcohol Extract	0.84%	0.78%	0.89%
pH of Aqueous Extract	10.75	10.50	10.30

dyebaths were raised slowly to the boiling point in the specified time. Boiling was maintained for the time intervals shown below. Additions of chemicals were made as specified, and the original volume was restored by adding hot water after each 30 minute boiling period. The pH of the dyebath was determined after the dyeings were finished. In the specific dyeing formula given for each class of dye the percentages are based on the weight of the dry scoured wool.

Acid Dyes

2.0% dye
10.0% Calcined Glauber's Salt
1.5% Sulfuric Acid
Bring to boil in 30 minutes, add
1.5% Sulfuric Acid
Boil 30 minutes, rinse and dry.

Metallized Dyes

2.0% dye
8.0% Sulfuric Acid
Bring to the boil in 30 minutes
Boil 1½ hours, rinse and dry.

Milling Acid Dyes

2.0% Dye
10.0% Calcined Glauber's salt
6.0% Ammonium Sulfate
Bring to the boil in 30 minutes.
Boil 30 minutes, add
2.0% Acetic Acid 28%
Boil 30 minutes, rinse and dry.

Topchrome Dyes

2.0% Dye
10.0% Calcined Glauber's salt
4.0% Acetic Acid 28%
Bring to the boil in 30 minutes,
boil 30 minutes, add
3.0% Acetic Acid 28%
Boil 30 minutes, add
1.0% Sodium Bichromate
Boil 30 minutes, rinse and dry.

Metachrome Dyes

2.0% Dye
10.0% Calcined Glauber's salt
3.0% Ammonium Sulfate
1.0% Neutral Sodium Chromate
Bring to the boil in 30 minutes,
boil 1 hour, add
2.0% Acetic Acid 28%
Boil 30 minutes, rinse and dry.

Bottom Chrome Dyes

Mordant Bath:
3.0% Sodium Bichromate
5.0% Cream of Tartar
Enter at 140°F. bring to the boil in 30 minutes, boil for 1½ hours, and rinse.

Dyebath:
2.0% Dye
2.0% Ammonium Sulfate
Bring to the boil in 45 minutes,
boil 1½ hours,
Rinse and dry.

C. Rating of Tippy Dyeing Characteristics: The resulting dyeings were carefully examined and graded with respect to their uniformity of color. Those which displayed very marked evidence of tippy dyeing were rated as "poor", those which showed noticeable tippiness but to a lesser degree were denoted as "moderate", while those which were uniformly colored, or practically so, received the rating of "good". No attempt was made in these ratings to distinguish between positive or negative tippiness. Generally speaking, however, dyes receiving a "poor" rating are usually in the "positive" category, while dyes with negative tippy characteristics may be found in the "moderate" group, or may even be rated as "good", since negative tippiness is much less visible than positive. In cases where prototype dyes were produced and tested by more than one laboratory, the rating represents the average of the several trials conducted. In a few cases where the results obtained in the individual laboratories were not in agreement, all samples in question were redyed under identical conditions in a single laboratory, thus eliminating variations due to water supply and other factors of difference between laboratories. All ratings obtained are given in Table III.

D. Practical Application: In order to illustrate the value and use of these tables, dyeings were made by a topchrome method on Australian stock and kid mohair with selections of dyestuffs which were rated "good". For example, several three-color combinations of Erio Chrome Flavine A (C. I. 219), Monochrome Black Blue GA, (Pr. 299), Erio Chrome Red B (C. I. 652), Acid Anthracene Brown LE (Pr. 204), and Monochrome Olive FBLA were used to produce a topchromed shade of brown. Regardless of the manner in which these dyestuffs were combined, uniformly level dyeings were obtained. The combination of three dyes which were rated "poor", however, resulted in very poor dyeings. For example, Acid Alizarine Flavine RA, (Pr. 1), Acid Alizarine Red B (C. I. 216) and Acid Chrome Blue 3GA, used with the same topchrome method, produced dyeings in which the tips were dyed a very heavy brown while the body sections were a light beige shade. When the red component of this latter combination was replaced by Erio Chrome Red B (C. I. 652), (rated "good" when dyed topchrome), the body sections were no longer beige, but distinctly reddish, while the tips were brown. This result indicates uniform distribution of the red dyestuff together with tippy dyeing of the other dyes in the combination. As another example, a metachrome dyeing of Alizarine Yellow GG (C. I. 36) and Erio Chrome Azurol B (C. I. 720), both rated "good", resulted in a dyeing which was acceptable though not perfectly uniform. To show that this result was comparatively good, however, the blue was replaced by Brilliant Indocyanine G (Pr. 233) which is rated "poor". A dyeing was then obtained which was very much inferior to the first, exhibiting yellow body parts and green tips even though the same yellow dye was used as previously.

Examination of Table III reveals that variations in relative tippiness may be observed with certain dyes, particularly chrome color, according to the procedure used. In certain cases, therefore, improvements in tippy dyeing can be obtained by modifying the dyeing technique. It has been found, for example, that dyes applied by the topchrome procedure usually produce better results than when dyed metachrome. In raw stock the original locks of loose wool are so intermingled that it is difficult to differentiate with certainty between the tip and body sections of the fibers. In order to observe the extent of tippy dyeing, therefore, samples of actual fleeces were carefully cleaned without felting and placed in the dye kettle along with regular stock. Such a procedure is valuable in determining whether dyes are acting positively or negatively. During experiments carried out in this manner, it was observed that Acid Anthracene Brown LE dyes positively when dyed by the metachrome method, and negatively when dyed topchrome. Von Bergen has noted a similar effect with Alizarine Cyanine Green E (C. I. 1078) depending upon the use of an organic or a mineral acid. However, while in some instances the choice of dyeing procedure will produce a positive or negative reaction with certain dyes, or may eliminate tippiness to a large extent, the general solution to the problem does not lie in this direction. It may also be possible to minimize tippy dyeing effects by using a combination of positive and negative types of dyes. In actual practice, however, the dyer may not be able to use this method successfully because of the lack of available dyestuffs of similar shade, fastness and dyeing properties and the difficulty of properly balancing the number of different dyes which would be needed to produce the correction.

Fig. 1. Tippy Wool
Positive type

Fig. 2. Tippy Staples
Extremely positive effect

Fig. 3. Extreme effect
on tippy wool (tips red)

Fig. 4. Lamb's fleece
dyed to reveal tippiness

Fig. 5. Staples
exhibiting tippiness

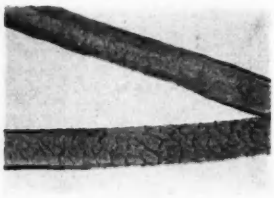


Fig. 6. Body and Tip
of same fiber. Lateral view

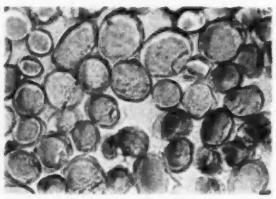


Fig. 7. Cross sections
of tips of fibers

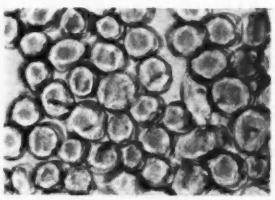


Fig. 8. Cross Sections
of body portions

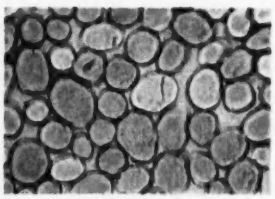


Fig. 9. Orange Y
at the boil

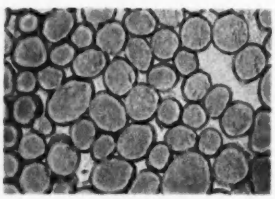


Fig. 10. Orange Y
after 30 min. boil

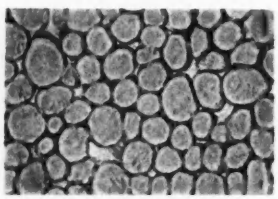


Fig. 11. Orange Y
after 1 hour boil

Fig. 12. Zoning on Texas Wool.
Alizarine Cyanine Green

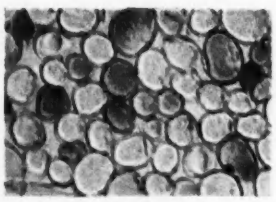


Fig. 13. Amaranth
at the boil

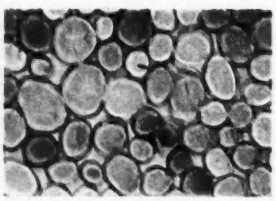


Fig. 14. Amaranth
after 30 min. boil

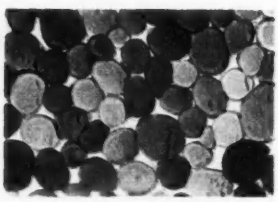


Fig. 15. Amaranth
after 1 hour boil

Fig. 16. Tippy wool dyed with
Calcomine Fluorescent Violet 2G
viewed in ordinary light

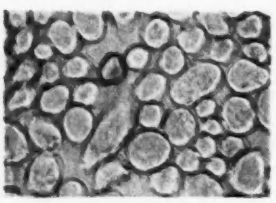


Fig. 17. Milling Orange
at the boil

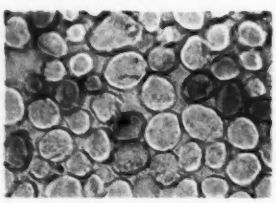


Fig. 18. Milling Orange
after 30 min. boil

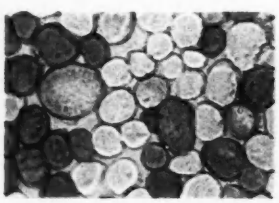


Fig. 19. Milling Orange
after 1 hour boil

Fig. 20. Fluorescent Violet 2G
Tippy wool viewed in
ultra-violet light

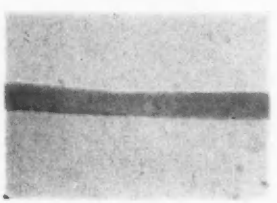


Fig. 21. Fiber tip
dyed with Orange Y

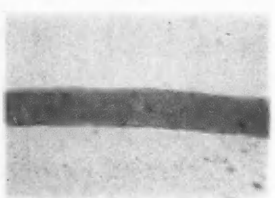


Fig. 22. Center of fiber
dyed with Orange Y

Fig. 23. Body portion of fiber
dyed with Orange Y

Fig. 24. Fluorescent Violet 2G
Cross Sections viewed in
ultra-violet light

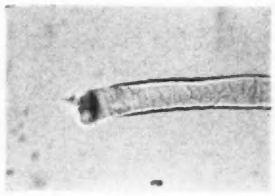


Fig. 25. Fiber tip
Anthracene Brown LE

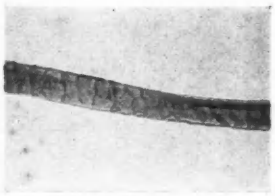


Fig. 26. Center of fiber
Anthracene Brown LE

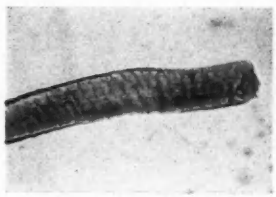


Fig. 27. Body portion of fiber
Anthracene Brown LE

Fig. 28. Staple dyed with Brown LE, showing tips uncolored

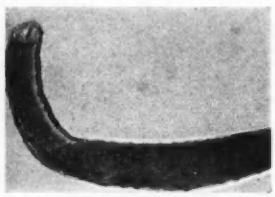


Fig. 29. Fiber tip
Acid Anthracene Brown PG

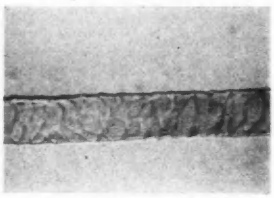


Fig. 30. Center of fiber
Acid Anthracene Brown PG

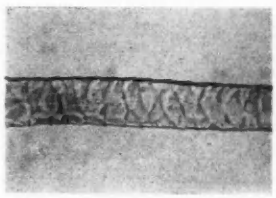


Fig. 31. Body portion of fiber
Acid Anthracene Brown PG

Fig. 32. Staple dyed with
Acid Anthracene Brown PG
Showing tips heavily dyed

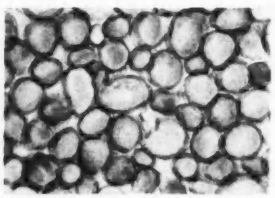


Fig. 33. Acid Anthracene Red 3B
with leveling agent

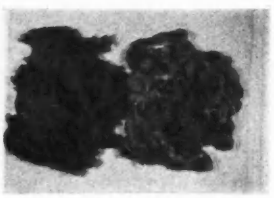


Fig. 34. Fleece dyed
with Acid Anthracene Red 3B
with and without agent

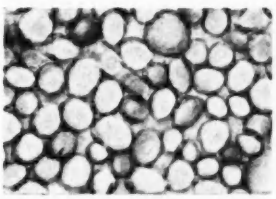


Fig. 35. Acid Anthracene Red 3B
without leveling agent

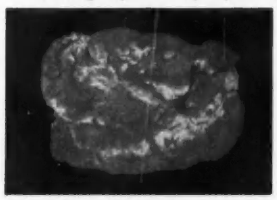


Fig. 36. Acid Anthracene Red 3B
Reverse effect of agent
showing tips uncolored

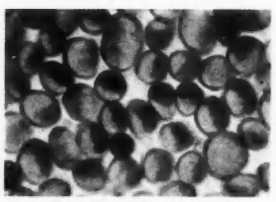


Fig. 37. Indocyanine B
with leveling agent

Fig. 38. Fleece dyed
with Indocyanine B
with and without agent

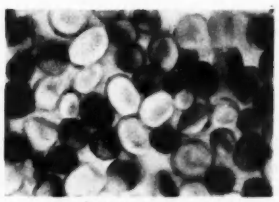


Fig. 39. Indocyanine B
without leveling agent

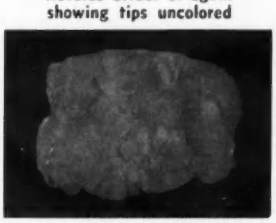


Fig. 40. Acid Anthracene Red 3B
Body view of fleece dyed
with leveling agent

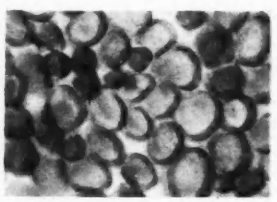


Fig. 41. Chrome Red ECB
with leveling agent

Fig. 42. Fleece dyed
with Chrome Red ECB
with and without agent

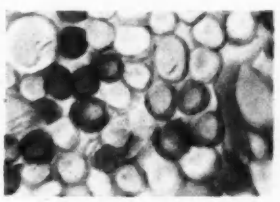


Fig. 43. Chrome Red ECB
without leveling agent

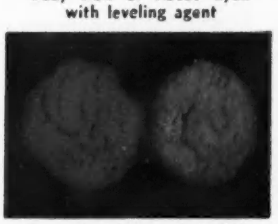


Fig. 44. Chrome Red ECB
Fleeces with and without
leveling agent—carded

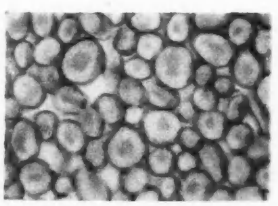


Fig. 45. Chrome Brown PG
with leveling agent

Fig. 46. Fleece dyed
with Chrome Brown PG
with and without agent

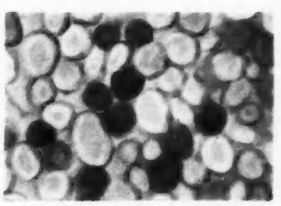
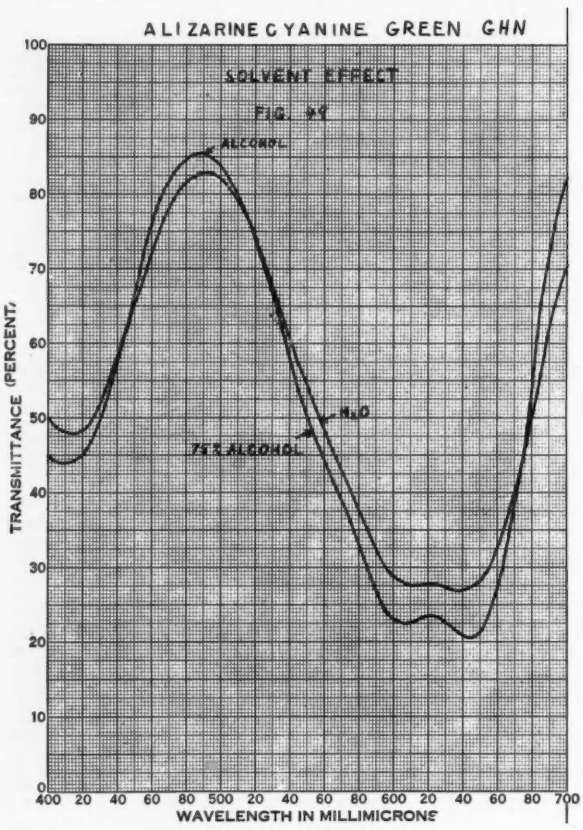
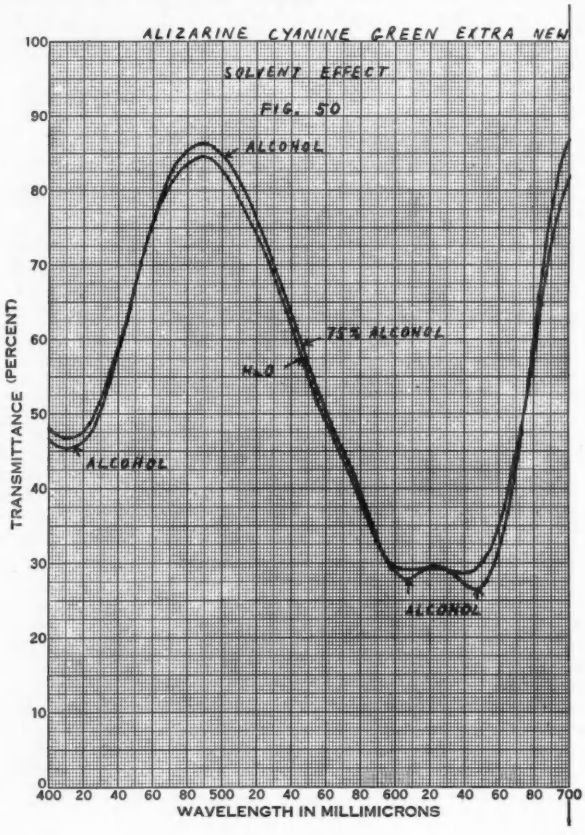
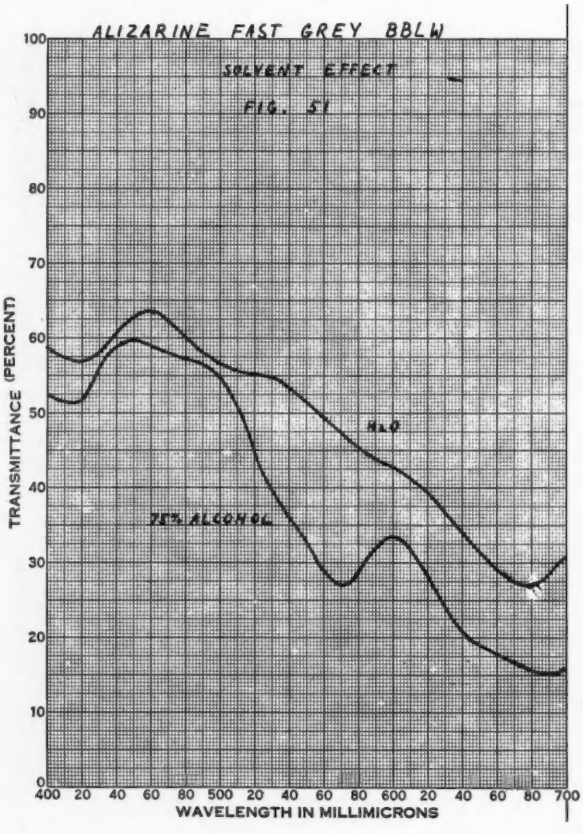


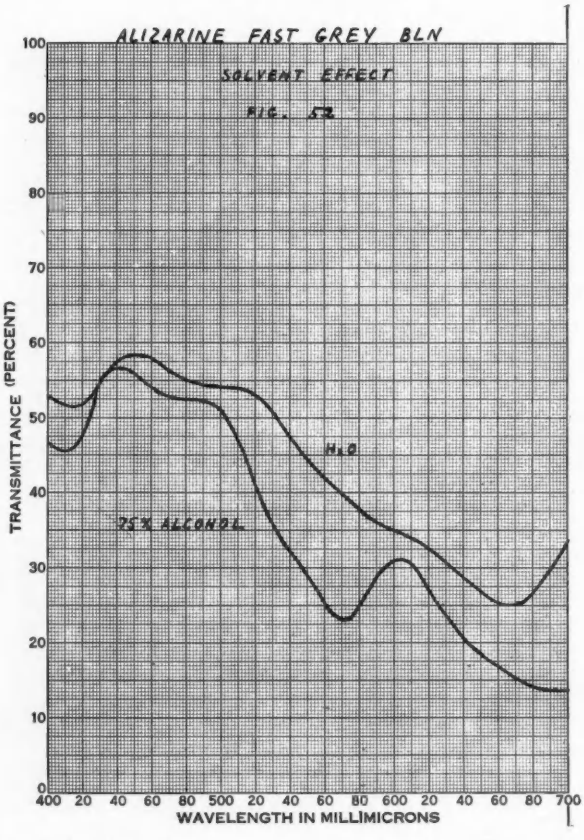
Fig. 47. Chrome Brown PG
without leveling agent

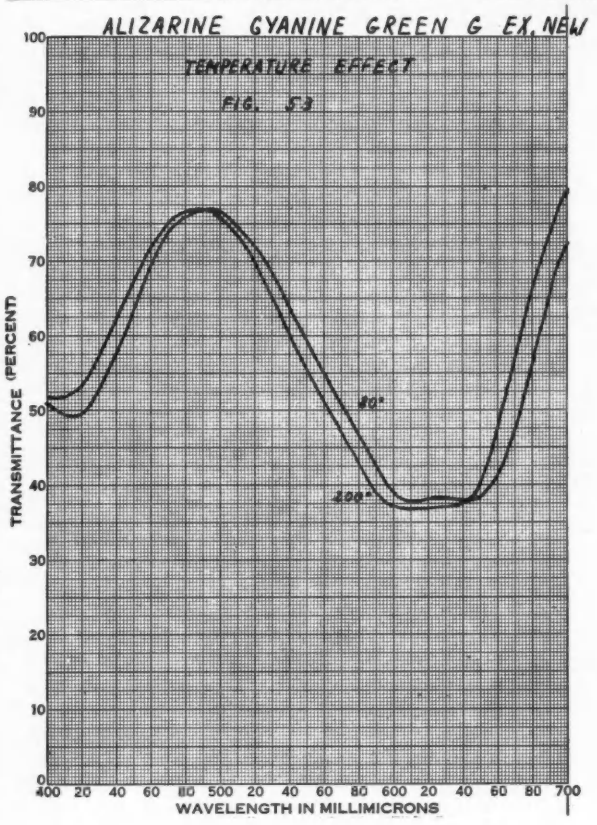
Fig. 48. Chrome Brown PG
Fleeces with and without
leveling agent—carded

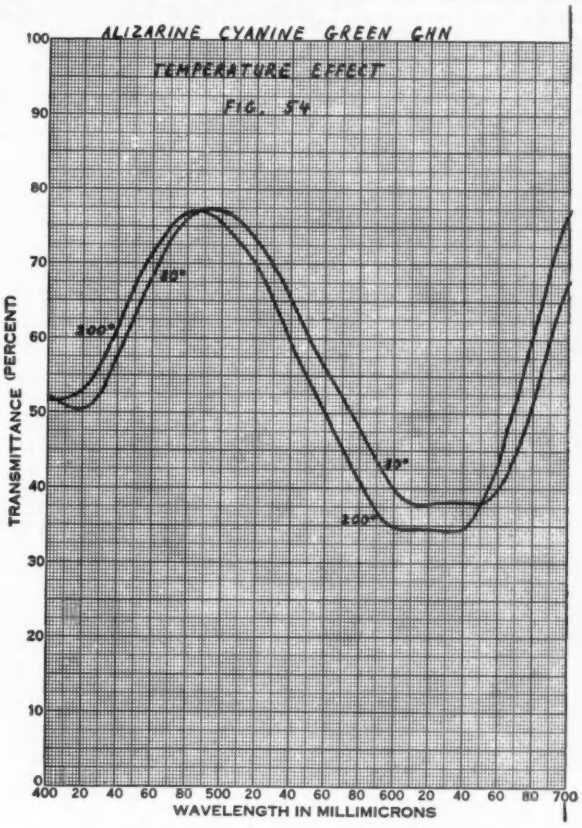

ALIZARINE CYANINE GREEN GHN
SOLVENT EFFECT
FIG. 49
ALCOHOL
H₂O
75% ALCOHOL
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS

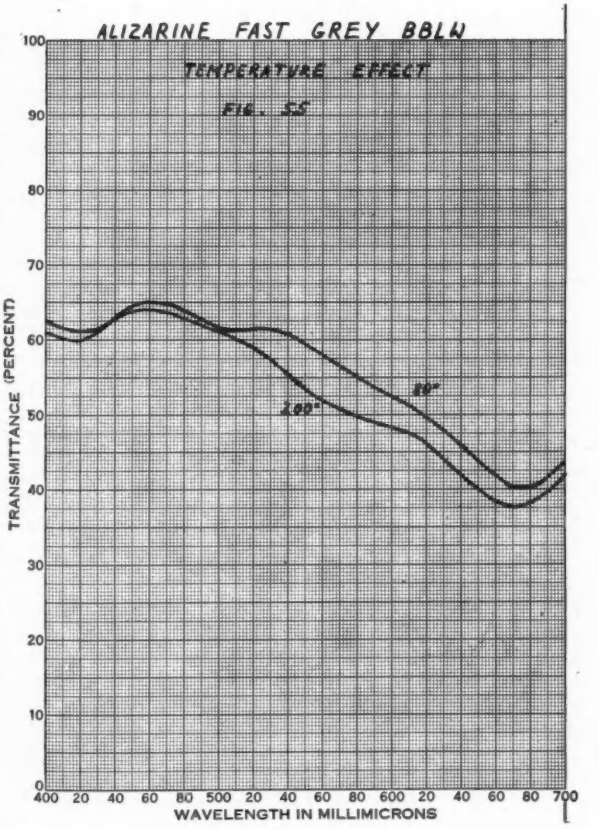

ALIZARINE CYANINE GREEN EXTRA NEW
SOLVENT EFFECT
FIG. 50
ALCOHOL
75% ALCOHOL
H₂O
ALCOHOL
ALCOHOL
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS

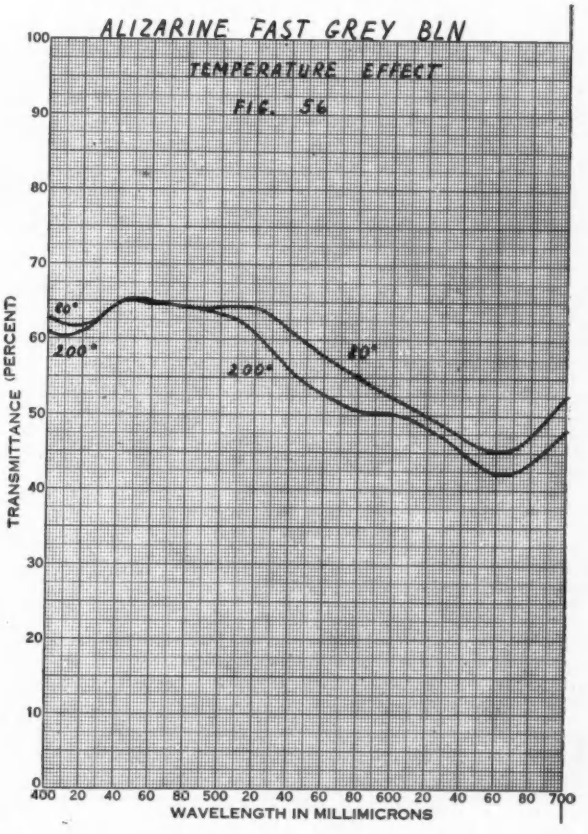

ALIZARINE FAST GREY BBLW
SOLVENT EFFECT
FIG. 51
H₂O
75% ALCOHOL
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS


ALIZARINE FAST GREY BLN
SOLVENT EFFECT
FIG. 52
H₂O
75% ALCOHOL
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS


ALIZARINE CYANINE GREEN G EX. NEW
TEMPERATURE EFFECT
FIG. 53
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS
80°
200°


ALIZARINE CYANINE GREEN GHN
TEMPERATURE EFFECT
FIG. 54
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS
80°
200°


ALIZARINE FAST GREY BBLW
TEMPERATURE EFFECT
FIG. 55
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS
80°
200°


ALIZARINE FAST GREY BLN
TEMPERATURE EFFECT
FIG. 56
TRANSMITTANCE (PERCENT)
WAVELENGTH IN MILLIMICRONS
80°
200°

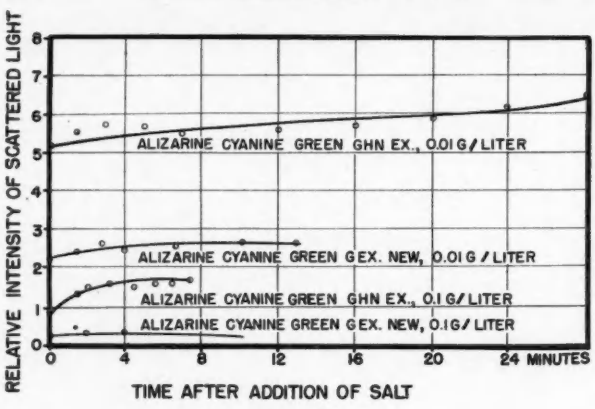

RELATIVE INTENSITY OF SCATTERED LIGHT
ALIZARINE CYANINE GREEN GHN EX., 0.01 G/LITER
ALIZARINE CYANINE GREEN G EX. NEW, 0.01 G/LITER
ALIZARINE CYANINE GREEN GHN EX., 0.1 G/LITER
ALIZARINE CYANINE GREEN G EX. NEW, 0.1 G/LITER
0 4 8 12 16 20 24 MINUTES
TIME AFTER ADDITION OF SALT

Fig. 57

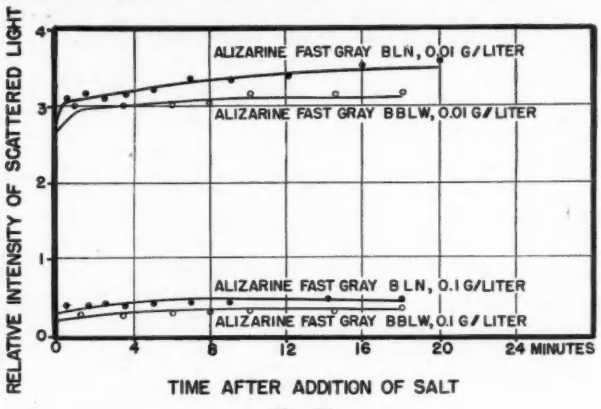

RELATIVE INTENSITY OF SCATTERED LIGHT
ALIZARINE FAST GRAY BLN, 0.01 G/LITER
ALIZARINE FAST GRAY BBLW, 0.01 G/LITER
ALIZARINE FAST GRAY BLN, 0.1 G/LITER
ALIZARINE FAST GRAY BBLW, 0.1 G/LITER
0 4 8 12 16 20 24 MINUTES
TIME AFTER ADDITION OF SALT

Fig. 58

2. Chemical Modification of the Fiber.

In 1937 Speakman and McMahon [13] confirmed and enlarged upon previous findings that the sulfur content of the exposed tip is lower than that of the body portion of the wool fiber. They further reported that the tips were extremely high in sulfhydryl content. Microchemical analyses of the Australian wool stock used in the present experiments supported these findings, and are given in Table II. These analyses, based on the absolute dry weight of the wool, reveal a decrease of 10% of total sulfur in the tips of the fibers.

It has been observed that the dyeing properties of the wool fiber and the distribution of many dyes in it are influenced by differences in chemical composition and physical structure. The possibility of control of tippiness in wool by chemical pretreatment is of practical importance, quite apart from its theoretical implications. Dyeings were made on wool reduced with thioglycollic acid by the method due to Harris and his associates, [18] and it was found that wool so modified, even after re-linkage of the sulfhydryl groups with short hydrocarbon groups, exhibits the dyeing properties of wool exposed to light. Experiments have further established that the reduced wool is colored red in the same manner as the exposed tips of fleece wool when dyed by a method due to Christison,* while untreated wool dyes greenish blue similar to the body parts of the fleece. Since the original cystine bridge no longer exists in Harris modified wool, these results provide evidence of the destruction of the sulfur linkage in the tips of wool fibers damaged by light.

It has been reported by Race, Rowe, and Speakman, [5] that violet chromium acetate is effective in the control of tippy dyeing. The possibilities of this method were therefore considered in detail, and samples of violet chromium acetate were obtained through the kindness of Dr. J. B. Speakman and also from Swiss and German sources. The procedure followed in these experiments consisted of pretreating the wool for 30 minutes at 40° C. in a bath prepared with 3% chromium acetate and 4% glacial acetic acid. The effectiveness of three chromium acetate samples was examined in five laboratories by this method, and the treated wool was dyed with Diamond Black PV (C. I. 170), Acid Anthracene Brown PG (Pr. 4), Acid Anthracene Red 3B (C. I. 487), Brilliant Indocyanine G (Pr. 233), Acid Alizarine Flavine RA (Pr. 1), Erio Chrome Red B (C. I. 652), Monochrome Black Blue GA (Pr. 299), and Acid Anthracene Brown LE, (Pr. 204). None of these dyeings exhibited any reduction in tippiness by the chromium acetate pretreatment, while in certain cases the effect was accentuated. These results indicate that attempted re-linkage of the sulfhydryl groups by this method does not reduce the tendency to tippy dyeing.

3. Leveling Agents

In view of the impracticability of the method of balanced selection of dyes, and the lack of promising chemical pretreatments, a third approach to the practical prevention of tippy dyeing was made. Certain agents which affect the rates of exhaustion of various dyes have become known popularly as leveling agents. Several agents of this type which have appeared recently on the market, are recommended for the prevention or reduction of tippy dyeing. To illustrate the effect of these agents, cross sections made from laboratory dyeings of Indocyanine B with and without a leveling agent are shown in (Fig. 37, 38, and 39). This dyestuff dyes tippy when normally applied by the chrome and milling procedures. Since no objective evaluation of compounds of this nature had been published, it was decided to evaluate a large number of both domestic and foreign products in regard to their effectiveness in the dyeing of tippy wools.

Dyeing tests were made both on raw stock and on flannel piece goods which had been previously exposed to light and weather. In all cases control dyeings were made with identical materials and conditions, except for the omission of the leveling agent. Many of the compounds tested produced little if any effect on the results obtained. Others showed some slight reduction of tippiness but did not produce the results claimed for them in advertising literature. Several of the many products tested however, showed considerable promise, and from these the following were selected for large scale mill trials:

Name	*Manufacturer*
Calofast Salt MD, Calomet Salt L	Calco
Peregal TW	General
Cystol W	Geigy
X—Tip	Drew

* Private communication from Hugh Christison. His method requires a combination of Palatine Fast Pink BNA, Fast Light Yellow 2G, and Alizarine Astrol B, dyed at the boil for 15 minutes, with 3% acetic acid 28%, and 10% Calcined Glauber's salt.

TABLE II
Australian Wool

	Carbon	*Hydrogen*	*Nitrogen*	*Sulfur*
Tip ends	48.2%	7.36%	15.3%	3.05%
Center Portion	48.6	7.59	15.5	3.21
Body Portion	49.5	7.62	15.4	3.38

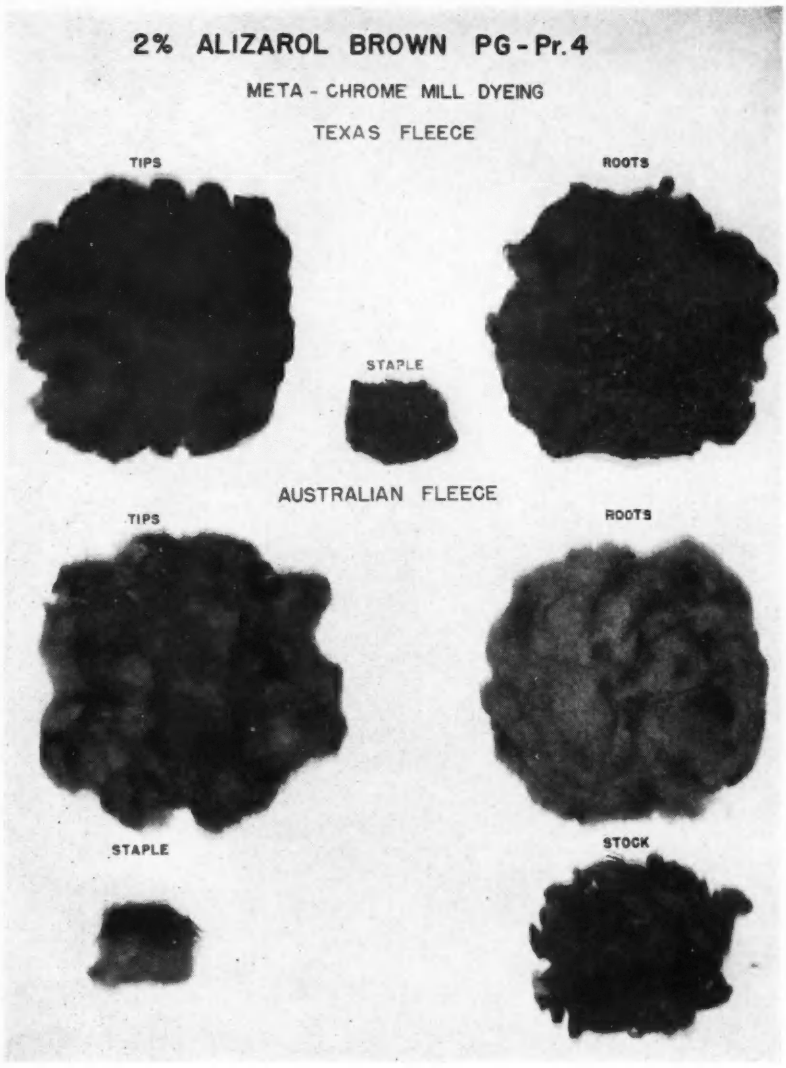


Fig. 59

The practical mill trials were carried out at the Forstmann Woolen Company, Passaic, N. J., Alexander Smith Carpet Company, Yonkers, N. Y., and S. Stroock & Company at Newburgh, N. Y. Large batches of the same wools as were used in laboratory studies were dyed in these trials, which included 64's Australian and Texas wools, South American carpet wool and kid mohair. These types were dyed with milling and chrome dyes, in each case comparative batches being dyed with and without the presence of a leveling agent. Acid Anthracene Red 3B (C. I. 487), Acid Anthracene Brown PG, (Pr. 4), and a combination of Erio Chrome Red B, Acid Alizarine Flavine RA, and Monochrome Black Blue GA were selected for mill trials because of their extreme tendency to positive tippiness. The latter combination was applied on carpet wool, and is discussed later in the text. The procedures used are given below:

PROCEDURES USED IN MILL DYEINGS

All chemicals and dyes based on the weight of dry wool.

Procedure No. 1 (Metachrome) Liquor Ratio 30-1.

2% Acid Anthracene Brown PG (Pr. 4)

1. Wet out batch in water at 140° F., for 15 minutes.
2. Add 5% Glauber's salt and 2% leveling agent, run 15 minutes (pH—8.8).
3. Add 1% sodium dichromate, run 15 minutes.
4. Add 2% dyestuff. Run 15 minutes.
5. Add 3% ammonium sulfate. (pH—7.7).
6. Raise to the boil in 1 hour.
7. Add 2% acetic acid (80%) over ½ hour period.
8. Boil 1 hour (pH—5.5).
9. Cool and rinse batch and dump.

Procedure No. 2 (Metachrome) Liquor Ratio 30-1.

2% Erio Chrome Red B (C. I. 652)

1. Wet out batch in water at 140° F., for 15 minutes.
2. Add 4% magnesium sulfate and 2% leveling agent, run 15 minutes.
3. Add 1% ammonia, run 15 minutes (pH—8.9).
4. Add 1% sodium dichromate, run 15 minutes.
5. Add dye, bring to the boil in 1 hour. (pH—7.8).
6. After ½ hour boil add 1% acetic acid (80%).
7. Boil ½ hour (pH—6.0).

Procedure No. 3 (Milling) Liquor Ratio 30-1.

2% Acid Anthracene Red 3B (C. I. 487)

1. Wet out wool at 110° F., for 15 minutes.
2. Add 5% Calcined Glauber's salt and 2% leveling agent. Run 15 minutes. (pH—8.9).
3. Add dyestuff, run 15 minutes.
4. Add 3% ammonium sulfate. (pH—8.0).
5. Raise to the boil in 1 hour.
6. Add ¾% acetic acid (80%) at the boil over ½ hour period.
7. Boil 1 hour. (pH—7.0).

Australian and Texas Wools

These trials were made in pressure machines on Australian and Texas wools. The control tests without agents confirmed the laboratory results inasmuch as the tips were dyed very heavily while the main portion of the staple remained lightly dyed. Although laboratory tests using 2% of the agents had given perfect uniformity between tips and body, it was found that the mill dyeings with Acid Anthracene Red 3B plus agents (procedure No. 3) showed a reverse effect, i.e., well-dyed body parts and light, undyed tips (Fig. 36 and 40). It is believed that this is the first observation of such an over-correction. Realizing that the use of 2% of the correcting agent was excessive for this particular dyestuff under the dyeing conditions prescribed, further practical dyeings were carried out in the same machines but using only ½% of the agents. This modification resulted in practically perfect dyeings, as shown in (Fig. 33, 34, and 35). The proper quantity of agent for the correction of tippy

TABLE III—TIPPY DYEING RATINGS

2% Dyeings

CCC—Calco Chemical Division, American Cyanamid Company
G—General Dyestuff Corporation
Gy—Geigy Company, Inc.
NAC—National Aniline Division

G—Good
M—Moderate
P—Poor

Acid Dyes

Average pH of exhausted dyebath = 3.2

Dyestuff Names	Mfr.	C. I. No.	Ratings: Australian Wool	Ratings: Kid Mohair
Calcocid Fast Light Yellow 3G Ex	CCC	636	G	G
Fast Light Yellow D3GA	G			
Fast Wool Yellow 3GL	NAC			
Fast Light Yellow 3G New	G	636	M	G
Calcocid Fast Yellow 2G	CCC	639	G	G
Fast Light Yellow 2G	NAC			
Fast Light Yellow GGNX Conc	G			
Erio Flavine 3G Supra	Gy			
Tartrazine C Extra	G	640	G	G
Calcocid Yellow MCG	CCC			
Wool Yellow Ex. Conc	NAC			
Calcocid Yellow S	CCC	10	G	G
Naphthol Yellow S	NAC			
Naphthol Yellow SNA	Gy			
Naphthol Yellow SXX New	G			
Calcocid Yellow BN	CCC	146	G	G
Indian Yellow GA	G			
Azo Yellow A5W	NAC			
Metanil Yellow Ex. Conc	G	138	G	G
Metanil Yellow 1955	NAC			
Metanil Yellow VS Conc	Gy			
Calcocid Yellow MXXX Conc	CCC			
Quinoline Yellow	NAC	801	G	G
Calcocid Yellow CW Conc	CCC			
Chinoline Yellow D Conc	G			
Amido Yellow EA–CF	G	11	G	G
Calcocid Fast Yellow JY	CCC		G	G
Fast Yellow YA Conc	G	16	G	G
Fast Silk Yellow GSN	G		M	G
Supra Light Yellow GGL	G		G	G
Supramine Yellow 3GL-CF	G		G	G
Flavazine 4G-CF	G		G	G
Brilliant Sulfo Flavine FFA	G	Pr 224	G	G
Azo Flavine RRA New	G	145	G	G
Supramine Yellow RA	G	Pr 195	G	G
Acid Orange R Ex	Gy	161	G	G
Wool Orange R Conc	NAC			
Orange RO Ex. Conc	G			
Calcocid Orange RR	CCC			
Calcocid Orange Y Ex. Conc	CCC	151	G	G
Orange YA Conc	Gy			
Wool Orange A Conc	NAC			
Acid Orange XX	G			

Dyestuff Names	Mfr.	C. I. No.	Ratings: Australian Wool	Ratings: Kid Mohair
Croceine Orange Y Conc	NAC	26	G	G
Calcocid Fast Light Orange 2G	CCC	27	G	G
Wool Orange 2G Crystals	NAC			
Acid Orange GG Crystals	Gy			
Fast Light Orange GA Conc	G			
Sulphon Orange GA	G	Pr 186	P	M
Wool Fast Orange GA	G	Pr 200	M	G
Lake Scarlet R	NAC	79	G	G
Calcocid Scarlet 2R	CCC			
Scarlet 2R Conc	Gy			
Scarlet RRA New	G			
Brilliant Scarlet 3R	NAC	185	M	G
Calcocid Brilliant Scarlet 3RN Conc	CCC			
Scarlet 4R Supra	Gy			
Scarlet 4RA Conc	G			
Brilliant Croceine 3BA	G	252	G	G
Croceine Scarlet MOO	NAC			
Calcocid Scarlet MOON	CCC			
Eosine YB High Conc	G	768	G	G
Calcocid Eosine G	CCC	114	G	G
Fast Acid Red E Conc	G			
Calcocid Erythrosine N	CCC	773	M	G
Erythrosine N Conc	G			
Rhodamine 6G Ex	G	752	G	G
Calcozine Red 6G Ex	CCC			
Rhodamine B Ex. S	G	749	G	G
Calcozine Red BX	CCC			
Sulpho Rhodamine B Ex	G		M	G
Phloxine TB	CCC	778	G	G
Phloxine RB	G			
Calcocid Phloxine 2G	CCC	31	M	G
Erio Phloxine 2G Supra	Gy			
Azo Phloxine GA Ex. Conc	G			
Fast Crimson GR	NAC			
Erio Fast Phyloxine BL Supra Conc	Gy	Pr 101	M	G
Calcocid Fast Red BL	CCC			
Fast Light Red BA	G			
Fast Wool Red GL	NAC			
Calcocid Fast Red A	CCC	176	G	G
Fast Red A	G			
Fast Red S Conc	NAC			
Roccelline S	Gy			
Calcocid Neutral Red GD	CCC	256	G	G
Calcocid Fast Red ASC	CCC		G	G

TABLE III—Acid Dyes—*(Continued)*

Dyestuff Names	Mfr.	C. I. No.	Ratings: Australian Wool	Ratings: Kid Mohair
Supramine Red 3BA	G	Pr 193	G	G
Acid Light Red G	NAC		M	M
Fast Wool Red BL	NAC		M	M
Anthralan Red BA-CF	G	Pr 210	G	G
Acid Brilliant Red BNR	NAC		P	M
Supramine Red BBLA	G		P	M
Fast Light Red 4BA	G		M	G
Acid Brilliant Red 4BL	NAC		P	M
Fast Red PAT	G		P	M
Calcocid Ceresine	CCC		M	G
Sorbine Red XN	G		M	G
Wool Red 40F	NAC	184	M	M
Supramine Red GGA—New	G	Pr 194	G	G
Calcocid Rose Bengal Rose Bengal DY Conc	CCC G	779	G	G
Azo Bordeaux	NAC	88	M	M
Acid Magenta O	G	692	P	M
Acid Bordeaux B	NAC		P	M
Supramine Bordeaux BA	G	Pr 191	M	G
Alizarine Rubinol 3G	G	1091	P	M
Alizarine Rubinol GW Acid Alizarine Red GWN	G NAC	1091	M	G
Alizarine Rubinol R Calcocid Alizarine Red RR	G CCC	1091	G	G
Supra Light Rubine BLA Fast Light Rubine BL	G NAC	Pr 188	P	P
Azo Rubine Ex Carmoisine BA Conc. New	NAC G	179	M	M
Fast Brilliant Crimson RB	NAC		P	M
Fast Fuchsine G	NAC	29	M	M
Azo Fuchsine GA	G		M	G
Acid Fuchsine D	NAC	30	M	M
Fast Fuchsine 6B	NAC	56	P	M
Acid Red R Conc Calcocid Fuchsine 6B Azo Fuchsine 6B New Fast Crimson 6BL	Gy CCC G NAC	57	P	M
Amido Brilliant Red BBA	G	57	P	M
Calcocid Fast Violet R Violamine RR Acid Violet 4RD Fast Acid Violet GRF	CCC G G NAC	758	M–G	M–G
Violamine AB Ex	G		M	G
Calcocid Fast Violet 2R Ex Victoria Fast Violet RRN Ex Fast Wool Violet 1R	CCC G NAC	Pr 197	M	G
Calcocid Violet 4BXN Acid Violet 6B Conc Formyl Violet S4BA Wool Violet 4BN	CCC Gy G NAC	698	P	M
Wool Violet 5BN	NAC	698	P	M
Calcocid Fast Violet BG Conc Acid Fast Violet BG	CCC NAC	699	P	M
Ethyl Acid Violet 4B Conc Calcocid Violet 4BS Conc Azo Wool Violet 4B	G CCC NAC	53	P	M
Fast Acid Violet 10BD Conc	G	696	P	M
Azo Wool Violet 7RD	G		P	M
Alizarine Violet NRR	NAC		G	G
Alizarine Geranol B-CF	G		P	M
Calcocid Alizarine Violet NC Alizarine Violet 3R	CCC NAC	1080	P	M
Alizarine Irisol RL	G		G	G
Alizarine Irisol RD	G		G	G
Acid Violet 4BLA	G		P	M
Alizarine Violet R Powder	NAC		P	M
Anthralan Violet 4BF	G		G	G
Acid Violet 6BNOC	G		P	M
Fast Acid Violet 10BG Ex	G		P	M
Calcocid Alizarine Blue RP Conc Alizarine Violet NR	CCC NAC	1073	G	G
Calcocid Alizarine Blue RO Conc Cyananthrol RXO	CCC G	1076	G	G
Calcocid Alizarine Blue SKY Alizarine Sky Blue B Alizarine Blue GRL	CCC G NAC	1088	G	G
Calcocid Alizarine Blue SE Alizarine Sapphire SE Erio Fast Cyanine SE Supra Alizarine Blue SAE Alizarine Blue WSA Alizarine Blue SEN	CCC NAC Gy G G G	1053	M	G
Calcocid Alizarine Blue A2G Alizarine Sapphire 2GL Alizarine Direct Blue AGG	CCC NAC G	Pr 10	G	G
Calcocid Alizarine Blue SAPX Erio Fast Cyanine S High Conc Calcocid Alizarine Blue SAPG Alizarine Sapphire Alizarine Blue SAP Alizarine Sapphire BN Alizarine Blue SAP Special Alizarine Sapphire BLN	CCC Gy CCC NAC G NAC G NAC	1054	M	M
Alizarine Blue GS	NAC		P	M

TABLE III—Acid Dyes—*(Continued)*

Dyestuff Names	Mfr.	C. I. No.	Ratings: Australian Wool	Ratings: Kid Mohair
Calcocid Blue AX	CCC	714	P	M
Alphazurine A	NAC			
Patent Blue AF Ex. Conc	G			
Indigotine	NAC	1180	M–G	G
Calcocid Indigotine S Conc	CCC			
Indigotine B Ex. Conc	G			
Calcocid Brilliant Blue FFR Ex	CCC	Pr 40	P	M
Brilliant Wool Blue FFRS Ex	G			
Brilliant Wool Blue FFR Ex	NAC			
Calcocid Fast Blue SR	CCC	208	P	M
Sulphon Acid Blue RA New	G			
Fast Wool Blue R	NAC			
Alizarine Supra Sky RA	G	Pr 207	M	G
Acid Cyamine BFA	G	853	P	M
Alizarine Astrol B	G	1075	G	G
Cyananthrol BGAOO	G	1077	G	G
Alizarine Supra Blue A	G	Pr 12	M–G	G
Alizarine Fast Blue RB	NAC			
Alizarine Direct Blue ARA	G	Pr 11	G	G
Wool Fast Blue FFGA	G	Pr 359	P	M
Alphazurine B Conc	NAC		P	M
Alphazurine FG	NAC	671	P	M
Neptune Blue BRA Conc	G			
Erioglaucine	Gy			
Patent Blue VF Ex. Conc	G	712	M	M
Alphazurine 2G	NAC			
Sulphon Acid Blue BA	G	209	P	P
Fast Wool Blue B	NAC			
Supramine Blue RA	G	Pr 190	M	G
Brilliant Acid Blue 3BG	G		P	M
Alizarine Supra Blue SESN–CF	G		P–M	M
Alizarine Sapphire SESN	NAC			
Supramine Pure Blue BL–CF	G		P	M
Supramine Blue FB	G		G	G
Alizarine Sky Blue FFG–CF	G		P	M
Wool Blue CGW	NAC		P	M
Wool Blue CGG	NAC		P	M
Alizarine Sapphire 4GL	NAC		P	M
Alizarine Sapphire EMM	NAC		P	M
Alizarine Sapphire 5GL	NAC		M	M
Amido Blue GGR	G		P	M
Fast Acid Blue CMG Conc	G			
Anthraquinone Blue Ex. Pdr	G			
Calcocid Green SB Ex	CCC	737	P	P
Calcocid Green S Ex	CCC			
Wool Green S	NAC			
Wool Green BSNA	G			
Calcocid Green G Conc	CCC	666	P	M
Acid Green L Extra	NAC			
Guinea Green BA Ex. Conc	G			
Naphthol Green B	NAC	5	P	P
Calcocid Green B Conc	CCC			
Acid Dark Green A	NAC	247	P	P
Calcocid Dark Green BI Conc	CCC			
Fast Acid Green B	NAC	667	P	M
Neptune Green SGXA	G			
Light Green SFA Conc	G	670	P	M
Alkali Fast Green 2G	NAC	735	P	M
Naphthaline Green V Ex. Conc	G			
Erio Green Ex	Gy			
Alkali Fast Green 10GA	G	Pr 13	P	G
Alkali Fast Green 10G	NAC			
Supramine Green BL	G		P	M
Alphanol Brown BVA	G	Pr 208	P	M
Alizarine Light Brown BL	NAC		P	P
Supramine Brown R	G		M	G
Calcocid Blue Black 2R Ex. Conc	CCC	246	P	P
Calcocid Blue Black Ex. Conc	CCC			
Naphthylamine Black 10 BR–CF Conc	G			
Naphthylamine Blue Black RB	G			
Naphthylamine Black 8B	G			
Acid Black NCB New	G			
Buffalo Black NB	NAC			
Buffalo Black NBR	NAC			
Naphthol Blue Black G	NAC			
Naphthol Blue Black B	NAC			
Buffalo Black 8B	NAC	141	P	M
Buffalo Black 10B	NAC	294	P	P
Buffalo Black GRF	NAC		P	M
Buffalo Black RCW	NAC		P	M
Buffalo Black AR	NAC		P	P
Buffalo Black RB	NAC		P	P
Wool Black GRFN	G	241	P	M
Brilliant Black BRX	G	315	P	P
Supramine Black BRA Ex	G	Pr 189	M	M
Acid Black BCF	G		P	P

Alizarine Sapphire EMM	NAC		P	M
Alizarine Sapphire 5GL	NAC		M	M
Amido Blue GGR	G		P	M
Fast Acid Blue CMG Conc	G			
Anthraquinone Blue Ex. Pdr	G			
Brilliant Black BRX	G	315	P	P
Supramine Black BRA Ex	G	Pr 189	M	M
Acid Black BCF	G		P	P

TABLE III—TIPPY DYEING RATINGS—*Continued*

Milling Dyes

Average pH of Exhausted Dyebaths = 5.5

Dyestuff Names	Mfr.	C. I. No.	Ratings: Australian Wool	Ratings: Kid Mohair
Calcocid Milling Yellow 5GC Conc	CCC	642	G	G
Polar Yellow 5G Conc	Gy			
Calcocid Milling Yellow 3G	CCC			
Milling Yellow 3G	NAC			
Calcocid Milling Yellow 2GC Conc	CCC			
Polar Yellow 2G Conc	Gy			
Supranol Yellow GGA Conc	G			
Polar Yellow R Conc	Gy	542	M	G
Supranol Yellow RA	G	642	P	M
Supranol Yellow GGA Conc	G	642	G	G
Calcocid Milling Yellow R	CCC	Pr 187	P	M
Acid Milling Yellow G Supra	Gy	Pr 187	M	G
Sulphon Yellow RS Ex-CF	G	Pr 187	P	M
Fast Jasmine G Conc	Gy	145	G	G
Neutral Yellow RX	Gy		G	G
Milling Yellow O	G	Pr 139	P	M
Milling Yellow O Conc	NAC	Pr 139	M	G
Milling Yellow H5GA–CF	G	Pr 138	G	G
Milling Yellow NGS	NAC		G	G
Milling Yellow XN	NAC		G	G
Milling Yellow 2GCW	NAC		M	G
Fast Acid Yellow GS	NAC		G	G
Fast Acid Yellow 5G Conc	NAC		G	G
Calcocid Milling Orange GSC Conc	CCC	Pr 152	G	G
Polar Orange R Conc	Gy	Pr 152	G	G
Supranol Orange RA Conc	G	Pr 152	M	M
Milling Orange R	NAC	Pr 152	M	M
Calcocid Milling Orange G	CCC	Pr 186	P	G
Sulphon Orange GA	G	Pr 186	P	G
Polar Orange GS Conc	Gy	Pr 151	M	G
Calcocid Milling Orange 4R Conc	CCC		P	G
Neutral Orange GX	Gy		G	G
Milling Orange GR	NAC		P	P
Milling Orange G	NAC	377	G	G
Acid Milling Red R Conc	Gy	487	P	G
Brilliant Milling Red RA	G			
Acid Milling Red RN	NAC			
Calcocid Milling Red 3B	CCC			
Calcocid Milling Red G	CCC	443	M	G
Acid Milling Red G	NAC			
Acid Milling Red G Conc	Gy			
Wool Scarlet BR	NAC	280	M	G
Cloth Red G	NAC			
Fast Scarlet BA	G			
Calcochrome Red 650	CCC			
Cloth Red B	NAC	262	P	P
Cloth Red BN High Conc	G			
Cloth Red 2B Ex. Conc	Gy			
Calcocid Milling Red BC Conc	CCC		M	G
Calcocid Milling Red 7B Conc	CCC	Pr 153	M	G
Acid Anthracene Red GD Ex. Conc	G	443	M	G
Calcocid Milling Red GP Conc	CCC	430	M	G
Calcocid Milling Red RC Conc	CCC	430	M	G
Polar Red G Conc	Gy	430	G	G
Polar Red RS Conc	Gy	430	M	G
Polar Red R Conc	Gy	430	G	G
Polar Red B Conc	Gy	430	M	G
Polar Red 3B Conc	Gy	430	M	G
Supranol Red PG	G	430	M	G
Supranol Red PRX	G	430	M	G
Supranol Red PBX	G	430	M	M
Supranol Red RA	G	430	M	M
Milling Red R	NAC	430	M	G
Milling Scarlet G Conc	NAC	430	G	G
Calcomine Red FC	CCC	419	M	G
Diamine Fast Red FA	G			
Diphenyl Fast Red B Conc	Gy			
Erio Fast Red FD	NAC			
Calcomine Scarlet 3B	CCC	382	G	G
Diphenyl Red 3B Supra	Gy			
Diamine Scarlet 3BA	G			
Erio Scarlet 3B	NAC			
Calcomine Scarlet B	CCC	382	M	G
Diphenyl Red BS	Gy			
Diamine Scarlet BA	G			
Erie Scarlet B	NAC			
Cloth Red 2R	NAC	253	M	M
Calcocid Milling Red 3R Conc	CCC	275	G	G
Polar Brilliant Red G Conc	Gy		P	M
Polar Brilliant Red B Conc	Gy		M	M
Polar Brilliant Red 3BN Conc	Gy		M	G
Polar Brilliant Red 5B Conc	Gy		P	G
Polar Red RL Conc	Gy		P	G
Polar Maroon V Conc	Gy		M	G

TABLE III—Milling Dyes—*(Continued)*

Dyestuff Names	*Mfr.*	*C.I. No.*	*Ratings* Australian Wool	Kid Mohair
Supranol Brilliant Red BA–CF	G		P	G
Supranol Red BB	G		M	M
Brilliant Milling Red B Conc	NAC		P	G
Brilliant Milling Red 3B	NAC		P	M
Calcocid Indo Blue B Indocyanine BA	CCC G	Pr 128	P	M
Wool Fast Blue BLA Brilliant Wool Blue BLN Supra Calcocid Fast Blue BL Wool Fast Blue BL	G Gy CCC NAC	833	M	G
Calcocid Fast Blue GL Wool Fast Blue GLA Ex Wool Fast Blue GL Brilliant Wool Blue GL Supra	CCC G NAC Gy	833	M	M
Calcocid Navy Blue 3R Conc	CCC	289	M	G
Calcocid Navy Blue R	CCC	289	M	G
Sulphon Cyanine 5RA	G	289	M	G
Sulphon Cyanine BBA New	G	289	M	G
Sulphon Cyanine GRA Ex	G	289	M	G
Fast Wool Cyanone 3R	NAC	289	M	G
Fast Wool Cyanone G Calcocid Navy Blue 2G Sulphon Cyanine GA	NAC CCC G	288	P	G
Calcocid Milling Blue BC Milling Blue BA New Brilliant Milling Blue B	CCC G NAC	Pr 37	P	G
Brilliant Indocyanine 6BA–CF Calcocid Indo Blue 6B Brilliant Acid Blue 6BN	G CCC NAC	Pr 222	P	M
Brilliant Indocyanine GA Calcocid Indo Blue G Wool Acid Blue GI	G CCC NAC	Pr 223	P	M
Sulphon Navy Blue 3BN	G	304	P	M
Sulphon Navy Blue 4BA	G	304	P	M
Milling Navy Blue 4B	NAC		P	M
Fast Acid Blue WF	NAC		P	M
Polar Blue G Conc	Gy		M	G
Polar Brilliant Blue RAW Conc	Gy		P	G
Polar Brilliant Blue GAW Conc	Gy		M	G
Supranol Blue GGA	G		G	G
Brilliant Wool Blue G Ex	NAC		P	M
Brilliant Wool FFB Ex	NAC		P	M

Dyestuff Names	*Mfr.*	*C.I. No.*	*Ratings* Australian Wool	Kid Mohair
Calcocid Milling Green 6B Fast Acid Green B	CCC NAC	667	P–M	G
Calcocid Milling Fast Green CR	CCC	735	P	M
Calcocid Alizarine Green CG Ex	CCC	1078	P	G
Calcocid Alizarine Green CGN Ex	CCC	1078	M	G
Alizarine Cyanine Green EF New	G	1078	P	M
Alizarine Cyanine Green G Ex. New	G	1078	P	M
Alizarine Cyanine Green GHW	G	1078	G	G
Alizarine Cyanone Green G Ex	NAC	1078	P	M
Alizarine Cyanone Green GN Ex	NAC	1078	M	M
Supranol Fast Green BA Ex	G		P	P
Alizarine Cyanine Green GWA	G		M	G
Alizarine Cyanine Green 5G–CF	G		P	M
Alphanol Brown BUA	G	Pr 208	P	P
Supranol Brown RN Ex	G		M	M
Fast Acid Brown RG	NAC		P	M
Calcocid Neutral Black 2B Conc	CCC	304	M	G
Wool Blue Black 6B Conc	Gy	304	M	G
Wool Black BG Conc	Gy	304	G	G
Fast Sulphon Black NB	G	304	M	M
Milling Black B	NAC	304	P	M
Calcocid Fast Black B	CCC	307	G	G
Calcocid Fast Black 2B	CCC	307	M	G
Sulphon Cyanine Black BA New	G	307	G	G
Sulphon Cyanine Black DN	G	307	M	G
Durol Black 2B	NAC	307	M	G
Durol Black BA	NAC	307	M	G
Fast Sulphon Black A	G	306	P	P
Fast Sulphon Black RA	G	271	M	G
Alizarine Fast Grey BBLW	G	Pr 206	P	M
Calcochrome Alizarine Gray 2BL	CCC			
Alizarine Fast Grey BLN Calcochrome Alizarine Gray 2BLS	G CCC	Pr 206	G	G
Neotolyl Black TLA Ex	G		M	G
Polar Grey	Gy		P	M
Polar Grey-Greenish	Gy		P	P

TABLE III—TIPPY DYEING RATINGS—*Continued*
Metallized Dyes
Average pH of Exhausted Bath = 2.3

Dyestuff Names	*Mfr.*	*C.I. No.*	*Ratings*	
			Australian Wool	*Kid Mohair*
Calcofast Wool Yellow R Gycolan Yellow GRL	CCC Gy		M–G	G
Palatine Fast Yellow GRNA–CF	G	Pr 331	M–G	G
Chromolan Yellow NGR	NAC	Pr 316	M–G	G
Calcofast Wool Yellow N Gycolan Yellow BEL	CCC Gy		P–M	M
Palatine Fast Yellow ELNA–CF Chromolan Yellow BEN	G NAC	Pr 330	P–M	M
Calcofast Wool Yellow 8G	CCC		G	G
Calcofast Wool Orange RN Gycolan Orange GL	CCC Gy		M–G	G
Palatine Fast Orange GENA–CF	G	Pr 323	M	G
Chromolan Orange GN	NAC	Pr 315	M–G	G
Palatine Fast Orange GNA	G	Pr 324	M–G	G
Gycolan Orange RL Chromolan Orange R	Gy NAC	Pr 146	M	G
Palatine Fast Orange RNA–CF	G	Pr 325	M	G
Calcofast Wool Red GA	CCC		G	G
Palatine Fast Red RNA	G	Pr 327	M	G
Chromolan Red 3B	NAC		P	P
Calcofast Wool Pink N	CCC	Pr 326	M	G
Gycolan Pink BAL Palatine Fast Pink BNA High Conc	Gy G	Pr 326	P	M
Palatine Fast Pink B	G		M	G
Calcofast Wool Bordeaux BN	CCC		G	G
Gycolan Bordeaux RL Chromolan Bordeaux R	Gy NAC	Pr 145	M	G
Calcofast Wool Bordeaux RB Conc	CCC		M	G
Palatine Fast Claret RNA Conc. CF	G	Pr 320	G	G
Palatine Fast Claret BNA	G		P	M
Gycolan Red GRL	Gy		G	G
Calcofast Wool Red BX	CCC		G	G
Gycolan Violet	Gy		G	G
Palatine Fast Violet 5RNA–CF	G	Pr 329	P	M
Palatine Fast Violet 3RNA–CF	G	Pr 328	P	M
Chromolan Violet 2R	NAC		P	M
Calcofast Wool Green BS	CCC		G	G
Calcofast Wool Green DKB	CCC		M	M
Palatine Fast Green BLNA Conc. CF	G	Pr 321	G	G
Calcofast Wool Brown GM Gycolan Brown GEL	CCC Gy		M–G	G
Palatine Fast Brown GRND	G		M	G
Calcofast Wool Blue BN Palatine Fast Blue BNOA–CF	CCC G	Pr 318	M–G	G
Calcofast Wool Blue 2G Gycolan Blue GGL Palatine Fast Blue GGNA–CF Chromolan Blue NGG	CCC Gy G NAC	Pr 144	M–G	G
Calcofast Wool Blue R Conc	CCC		M	M
Palatine Fast Blue RRNA–CF	G	Pr 319	G	G
Palatine Fast Navy Blue LF	G		P	M
Chromolan Blue 3R	NAC		P	M
Calcofast Wool Blue 2B	CCC		M	M
Palatine Fast Marine Blue RENA–CF	G	Pr 322	P	M
Calcofast Wool Black WA Gycolan Black WAL Palatine Fast Black WANA Conc Chromolan Black NWA Conc	CCC Gy G NAC	Pr 143	P	M–P

dyeing therefore appears to depend to some extent upon the dyestuff. It is also dependent upon the liquor ratio, shorter ratios requiring less of the correcting agent. Dyeings made with 2% Erio Chrome Red B (procedure No. 2) showed practically complete elimination of tippiness when the leveling agent was added to the dyebath. (Figs. 41 to 44). In similar tests made with 2% Acid Anthracene Brown PG (procedure No. 1) the control dyeing showed a very strongly positive effect. Although the tests using 2% of the corrective agents indicated great improvement, the tips nevertheless remained slightly darker than the body portions of the fibers. (Fig. 45 to 48). Higher percentages of leveling agents failed to achieve further improvement for this dyestuff.

Mill trials with woolen and worsted piece goods were also made by the metachrome method with and without these leveling agents. In all cases the addition of agents gave a richer, more solid shade of greater levelness and strength.

It should be noted that the degree of tippiness varies with the origin of the wool. To illustrate the difference between the dyeing characteristics of fine Australian and domestic wools, both types of wools in fleece form were dyed together by procedure No. 1 using 2% Acid Anthracene Brown PG. Fig. 59 shows samples of these fleeces and staples mounted for comparison. Note that the body part of the Australian fleece is practically undyed while that of the Texas fleece is uniformly dyed and is almost equal in depth of shade to the tip portions. It is evident that the uniformity of dye absorption is greater in the Texas wool than in the Australian wool. The results of these dyeings not only illustrate the problem of tippy dyeing but also the difficulties encountered when dyeing mixed stocks. A practical method of overcoming these differences in the dyehouse is one of the urgent needs of the industry, particularly at the present time.

Kid Mohair

The metachrome dyeing of 2% Acid Anthracene Brown PG was repeated on kid mohair, again using 2% of leveling agent. While all dyeings using the agents showed great improvement over the control, the fibers still exhibited tips slightly darker than the body sections. In view of the dyeing properties of Acid Anthracene Brown PG when dyed metachrome, however, this result is considered entirely saitsfactory from a practical point of view.

Carpet Wool

South American carpet wool was dyed by procedure No. 1 with and without

TABLE III—TIPPY DYEING RATINGS—*Continued*
Chrome Colors

2% Dyeings

Average pH Top Chrome 5.6 Meta 6.0 Bottom 6.8

Dyestuff Names	*Mfr.*	*C. I. No.*	*Ratings*					
			Australian Wool			*Kid Mohair*		
			Chrome			*Chrome*		
			Top	*Meta*	*Bottom*	*Top*	*Meta*	*Bottom*
Calcochrome Yellow 3G Conc Erio Chrome Yellow 3G Alizarol Yellow 3G	CCC Gy NAC	52	G	G	G	G	G	G
Calcochrome Yellow O Superchrome Yellow 2G	CCC NAC	195	G	M–G	M	G	M–G	M–G
Calcochrome Yellow EFA Conc Erio Chrome Flavine A Chrome Yellow A Ex Alizarol Flavine A Conc	CCC Gy G NAC	219	G	M–G	G	G	M–G	G
Calcochrome Yellow 2G Erio Chrome Yellow 2G Alizarine Yellow 2G Alizarine Yellow 5GS Conc	CCC Gy G G	36	G	G	G	G	G	G
Calcochrome Yellow G	CCC	Pr 56	G	G	G	G	G	G
Calcochrome Yellow CGW 250% Erio Chrome Yellow C Fast Mordant Yellow GD Ex. Conc Alizarol Yellow CRM	CCC Gy G NAC	343	M–G	G	G	G	G	G
Calcochrome Yellow RN Erio Chrome Yellow RN Conc Mordant Yellow OD Superchrome Yellow RN	CCC Gy G NAC	197	P–M	P	M	M	P	M
Erio Chrome Yellow 6G	Gy	122	G	G	G	G	G	G
Calcochrome Yellow NFC Acid Alizarine Flavine RA Ex Alizarol Flavine RA	CCC G NAC	Pr 1	M	M	P	M	M	G
Calcochrome Flavine G Diamond Flavine GA Ex	CCC G	110	G	G	G	G	G	G
Superchrome Yellow GRN	NAC	441	P	P	P	P	P	P
Erio Chrome Flavine 2R Conc	Gy		M	P	G	G	P	G
Erio Chrome Yellow ME	Gy		G	G	G	G	G	G
Chrome Yellow SSN	G		M	—	M	G	—	G
Monochrome Yellow FKEN	G		G	M	G	G	M	—
Chrome Yellow D	G		P	P	M	M	M	M
Superchrome Yellow 2G	NAC		M	M	M	G	G	G
Alizarol Yellow GW Conc	NAC		M	G	G	G	G	G
Alizarol Yellow GGN	NAC		M	M	G	M	M	G
Calcochrome Orange R Ex. Conc Terra Cotta RRN Conc Alizarine Yellow R Alizarol Orange R	CCC Gy G NAC	40	G	G	G	G	G	G
Erio Chrome Orange G Calcochrome Orange GR	Gy CCC	274	G	P	M	G	P–M	M–G
Calcochrome Orange LC	CCC		G	P	M	G	M	G
Wool Fast Orange GA	G	Pr 200	M	P	M	M	P	P
Chrome Fast Orange 3RLA	G	Pr 247	G	M	G	G	G	G
Erio Chrome Orange 2RL	Gy		G	G	G	G	G	G
Erio Chrome Orange RL	Gy		G	P	G	G	M	G
Alizarol Orange 3R	NAC		P	P	P	P	P	M
Alizarol Orange ML	NAC		G	G	G	G	G	G
Erio Chrome Phosphine RR	Gy	157	G	P	G	G	M	G
Calcochrome Fast Red ECB Erio Chrome Red B Conc Diamond Red ECB Ex. Conc Superchrome Red ECB	CCC Gy G NAC	652	G	P	G	G	P–M	G
Calcochrome Alizarine Red SC Alizarine Red WA Ex. Pdr Alizarine Red S Pdr	CCC G NAC	1034	G	P	M	M	P	G
Erio Chrome Red PE Conc Diamond Red BHA Ex. Conc Superchrome Red B	Gy G NAC	216	P	P	—	M	P	—
Erio Chrome Garnet L Acid Alizarine Garnet RA Superchrome Garnet Y	Gy G NAC	168	M	P	—	G	P	—
Erio Chrome Garnet R	Gy		G	M	G	G	G	G
Monochrome Red FGA Conc	G	Pr 300	G	G	G	G	G	G

TABLE III—Chrome Colors—*(Continued)*

Dyestuff Names	Mfr.	C. I. No.	Ratings					
			Australian Wool			Kid Mohair		
			Chrome			Chrome		
			Top	Meta	Bottom	Top	Meta	Bottom
Diamine Fast Red FA	G	419	P	P	—	M	P	—
Cloth Red BN Conc	G	262	M	—	—	M	—	—
Alizarine Y 20% Paste	NAC	1040	—	—	G	—	—	G
Alizarine Red A—Paste New Alizarine NAC—20% Paste	G NAC	1027	—	—	G	—	—	G
Erio Chrome Brilliant Red BL	Gy		P	P	P	P	P	P
Erio Chrome Red G	Gy		G	P	G	G	M	G
Erio Chrome Red 3B	Gy		G	P	M	G	P	M
Acid Chrome Red BA	G		P	P	M	G	M	G
Chromoxane Brilliant Red BL	G		G	M	G	G	G	G
Acid Alizarine Bordeaux BLT	G		G	P	M	G	P	G
Superchrome Red G	NAC		G	G	G	G	G	G
Erio Chrome Geranol R	Gy		P	P	P	P	P	P
Calcochrome Violet B	CCC	100	G	P	P	G	M	M
Erio Chrome Violet 5B Acid Chrome Blue 2RA	Gy G	Pr 7	M	P	M–P	M–G	P	M–P
Acid Alizarine Violet BA	G	169	G	—	M	G	—	G
Monochrome Violet FBA	G	Pr 301	G	G	G	G	G	G
Anthraquinone Violet D Pdr Anthraquinone Violet 3RA	G G	1080	P	M	P	M	M	M
Erio Chrome Violet 2R	Gy		M	P	P	M	P	P
Erio Chrome Brilliant Violet R	Gy		G	G	G	G	G	G
Erio Chrome Brilliant Violet B	Gy		G	G	G	G	G	G
Chromoxane Brilliant Violet REA	G		G	P	G	G	M	G
Chromoxane Brilliant Violet SBA	G		G	G	G	G	G	G
Chrome Brilliant Violet SB	NAC		G	G	G	G	G	G
Calcochrome Brilliant Blue BBG Erio Chrome Azurole BC Chromoxane Pure Blue BA Alizarol Azurine ECA	CCC Gy G NAC	720	G	G	G	M–G	G	G
Calcochrome Fast Blue BG Mordant Blue B	CCC NAC	Pr 93	P–M	—	P	M–G	—	M
Calcochrome Blue F4B Serichrome Blue R	CCC NAC	180	M	—	—	M	—	—
Calcochrome Blue RBN Ex	CCC	883	—	—	G	—	—	G
Erio Chrome Cyanine RC Chromoxane Cyanine RA Ex Alizarol Cyanine RC	Gy G NAC	722	P	—	P	M	—	P
Brilliant Alizarine Blue GA	G	931	M	—	P	M	—	P
Anthraquinone Blue SRN	G	1089	M	M	M	M	G	G
Alizarine Blue 2RC	NAC	1062	—	—	G	—	—	G
Erio Chrome Azurole G	Gy		G	G	G	G	G	G
Erio Chrome Blue S	Gy		P	P	P	P	P	P
Erio Chrome Blue 2GK	Gy		P	P	P	M	P	P
Anthracene Blue SWGGN	G		—	—	M	—	—	M
Anthracene Blue SWR	G		—	—	M	—	—	M
Anthracene Blue SWB	G		—	—	G	—	—	M
Anthracene Blue SWN	NAC		—	—	G	—	—	G
Acid Chrome Blue 3GA	G		P	—	P	P	—	P
Alizarine Chrome Blue FGN	G		P	P	—	G	P	—
Calcochrome Fast Green SGV Erio Chrome Verdon S Conc	CCC Gy	292	G	P	M–G	M–G	P	G
Calcochrome Green BB	CCC	302	P	P	P	M	M	M
Alizarine Cyanine Green EF	G	1078	P	P	P	M	P	P
Alizarine Cyanine Green G Ex. New	G	1078	P	P	P	M	M	M
Alizarine Cyanine Green GHN Ex	G	1078	G	G	G	G	G	G

TABLE III—Chrome Colors—*(Continued)*

Dyestuff Names	*Mfr.*	*C. I. No.*	*Ratings*					
			Australian Wool			*Kid Mohair*		
			Chrome			*Chrome*		
			Top	*Meta*	*Bottom*	*Top*	*Meta*	*Bottom*
Calcosid Alizarine Green CGN Ex	CCC	1078	M	—	—	M	—	—
Alizarine Cyanone Green G Ex	NAC	1078	P	P	M	M	M	G
Alizarine Cyanone Green GN Ex	NAC	1078	G	G	G	G	G	G
Erio Chrome Green L	Gy		G	P	M	G	P	M
Erio Chrome Brilliant Green GL	Gy		M	P	P	G	P	P
Alizarine Cyanine Green 5G	G		P	P	M	M	P	M
Alizarine Cyanine Green GWA	G		M	M	M	M	G	G
Monochrome Olive FBLA Conc	G		G	P	M	M	M	M
Erio Chrome Olive BL	Gy		M	P	M	M	M	M
Superchrome Olive GL	NAC		M	P	—	M	P	—
Chrome Green CB	NAC		P	—	P	P	—	P
Calcochrome Alizarine Brown RC	CCC		M	M	G	M	M	G
Calcochrome Red Brown 4BC	CCC		G	G	G	G	G	G
Calcochrome Brown B Pdr Chrome Brown RC Alizarol Brown RB Pdr	CCC G NAC	101	G	M	M	G	M	G
Calcochrome Brown EBR	CCC	Pr 14	M	M	M	M	G	G
Calcochrome Brown EB	CCC	Pr 14	M	P	P	G	M	M
Erio Chromal Brown AEB	Gy	Pr 14	G	P	G	G	M	G
Anthracene Chromate Brown EBA Ex	G	Pr 14	G	M	M	M	M	M
Alizarol Brown EB	NAC	Pr 14	M	P	P	G	P	M
Alizarol Brown ECB	NAC	Pr 14	G	P	M	G	M	G
Calcochrome Brown 2R Alizarol Brown 2R	CCC NAC	167	P	—	—	M	—	—
Calcochrome Brown PG Erio Chrome Brown PWS Acid Anthracene Brown PGA Ex Alizarol Brown PG	CCC Gy G NAC	Pr 4	P	P	P–M	M	P	P–M
Calcochrome Brown RH Erio Chrome Brown R Acid Anthracene Brown RHA Ex Alizarol Brown RH Conc	CCC Gy G NAC	98	M	P	M–G	G	P	G
Acid Anthracene Brown WSGA	G	Pr 205	G	—	G	M	—	M
Acid Anthracene Brown B Alizarol Brown 2AB	G NAC	Pr 2	M–G	P	P	M–G	P–M	M
Alizarol Brown G	NAC	238	G	G	G	G	G	G
Alizarine Brown R Pdr	NAC	1035	G	—	—	G	—	—
Erio Chrome Brown DKL	Gy		G	M	G	G	G	G
Alizarol Brown DKL	NAC		G	M	G	G	G	G
Erio Chrome Brown SWN	Gy		G	P	M	G	P	M
Erio Chrome Brown SDE	Gy		G	M	G	G	M	G
Erio Chrome Brown 5GL	Gy		P	P	P	P	P	P
Monochrome Brown BC Ex. Conc	G		—	M	P	—	M	M
Alizarol Brown B	NAC		M	P	—	M	M	—
Acid Anthracene Brown KE	G	Pr 203	M	P	P	M	P	P
Acid Anthracene Brown LE	G	Pr 204	G	M	G	M	M	G
Calcochrome Alizarine Blue Blk. B Calcochrome Alizarine Blue Blk. 3B Erio Chrome Gray AB Conc Alizarine Blue Black 3BA Alizarine Blue Black BA Alizarine Blue Black RA Alizarine Blue Black BG Alizarine Blue Black BA	CCC CCC Gy G G NAC NAC NAC	1085	G	M	G	G	M	G
Calcochrome Blue Black Conc Superchrome Blue B Ex Diamond Blue Blk. RBA High Conc	CCC NAC G	202	G	—	P	G	—	M
Diamond Blue Blk. RZF Supra Sp Superchrome Blue ZF Conc Erio Chrome Blue Black RZ	G NAC Gy	202	G	—	P	G	—	M
Calcochrome Blue Black BC Erio Chrome Blue Black BC Diamond Blue Black CB Ex Superchrome Blue BC	CCC Gy G NAC	201	G	—	P	G	—	M

TABLE III—Chrome Colors—*(Continued)*

Dyestuff Names	Mfr.	C. I. No.	Ratings					
			Australian Wool			Kid Mohair		
			Chrome			Chrome		
			Top	Meta	Bottom	Top	Meta	Bottom
Superchrome Blue BG Ex. Conc.	NAC	201	G	—	P	G	—	M
Calcochrome Black T Conc.	CCC	203	G	—	—	G	—	—
Erio Chrome Black T	Gy							
Chromogene Black ETOO Supra	G							
Superchrome Black T Conc.	NAC							
Calcochrome Black AC	CCC	204	G	—	—	G	—	—
Erio Chrome Black A	Gy							
Diamond Black EAN	G							
Superchrome Black BN Ex	NAC							
Calcochrome Black F	CCC	299	M	—	—	G	—	—
Calcochrome Black FB	CCC							
Erio Chrome Black DF Conc.	Gy							
Diamond Black FA	G							
Buffalo Chrome Black 2BN	NAC							
Buffalo Chrome Black F	NAC							
Buffalo Chrome Black 2BR	NAC							
Erio Chrome Grey SGL	Gy	Pr 299	G	P–M	M–G	G	M	G
Monochrome Black Blue GA	G							
Alizarol Blue Black G	NAC							
Diamond Black P 2BA Ex.	G	170	M	—	—	M	—	—
Diamond Black PV Ex. Conc.	G	170	M	—	—	M	—	—
Calcochrome Black PV Ex. Conc.	CCC							
Superchrome Black PV	NAC							
Calcochrome Black SE	CCC	336	M–G	—	—	M–G	—	—
Acid Alizarine Black SEA	G							
Alizarine Fast Grey BBLW	G	Pr 206	P	P	P	M	M	M
Calcochrome Alizarine Gray 2BL	CCC							
Alizarine Fast Grey BLN	G	Pr 206	G	G	G	G	G	G
Calcochrome Alizarine Gray 2BLS	CCC							
Acid Alizarine Black RA	G	172	G	—	—	G	—	—
Calcochrome Fast Black 3G	CCC		P	M	P	G	G	M
Erio Chrome Grey BL	Gy		M	P	M	G	P	M
Erio Chrome Grey 2GL	Gy		G	G	G	G	G	G
Erio Chrome Blue Black G	Gy		P	P	—	M	M	—
Alizarine Fast Grey BLN	G		G	G	—	G	G	—
Alizarol Grey CFG	NAC		P	P	M	P	P	M
Alizarol Black 3G	NAC		M	P	P	M	P	M
Superchrome Black WSE	NAC		P	—	—	M	—	—

leveling agents. In this case, however, a liquor ratio of 20:1 was used, with the following combination of dyes:

½% Erio Chrome Red B (C. I. 652)
½% Acid Alizarine Flavine RA (Pr. 1)
½% Monochrome Black Blue GA (Pr. 299)

The choice of this combination was made to illustrate the effect of agents when using mixtures of dyes having varying tip selectivity. All three dyestuffs are rated poor in Table III but exhibit different degrees of positive tippiness. The tests showed that in all cases the selected agents produced considerable improvement over the control dyeing, and gave nearly perfect uniformity.

The Evaluation of Correcting Agents

It is recommended that the evaluation of products which are offered for the correction of tippy dyeing be carried out with the combination of dyes used in the preceding paragraph, applied by the metachrome method. Brilliant Milling Red RA or a dye of similar characteristics may also be used. Comparative dyeings should be made in the same liquor ratio both with and without the agent under test. The combination of Fast Light Yellow 2G, Neolan Red 3B, and Alizarine Astrol B (See footnote, Page 16) is not recommended for the evaluation of correcting agents, since this unusual combination of dyestuffs is designed for application by a special dyeing method to achieve a striking and exaggerated effect.

Summary

Various aspects of tippy dyeing have been reviewed briefly, and it is shown that the destruction of the sulfur linkage in wool is related to the problem of tippiness. The chemical treatment of wool to reduce tippiness is considered briefly. The problem of control of tippy dyeing has been discussed, based on an extensive study of the dyeing characteristics of some 650 dyes. A table containing the information gained in this study is given for practical use in the selection of dyes exhibiting minimum tendencies to tippy dyeing. Extensive investigations of the behavior of leveling agents in both laboratory and plant are described. Trials made with five selected agents proved successful in the treatment of tippy wools and a method of practical value is suggested to obtain improved results.

It is the hope of the committee that the information in this article will serve to stimulate further research on the subject of tippy dyeing, leading to the elucidation of the action of agents effective in its treatment and control.

Acknowledgment

The committee greatly appreciates the cooperation received from the following companies:

Botany Worsted Mills, Passaic, New Jersey.

Calco Chemical Division, American Cyanamid Co., Bound Brook, New Jersey.

Forstmann Woolen Company, Passaic, New Jersey.

Geigy Company, Inc., New York, New York.

General Dyestuff Corporation, New York.

National Aniline Division, Allied Chemical and Dye Corporation.

Alexander Smith & Sons Carpet Company, Yonkers, New York.

S. Stroock & Company, Inc., Newburgh, New York.

The committee also wishes to thank I. H. Godlove and H. Hemmendinger of General Aniline & Film Corporation for the tests carried out on the aggregation of dyestuffs, C. Maresh of Calco Chemical Division for the preparation of cross sections and Kodachrome slides, and L. H. Turl of Calco Chemical Division for helpful criticism and assistance in the preparation of the text.

References

[1] Millson, Royer and Wisseman, Amer. Dyes. Rptr. *28*, P632, (1939).
[2] Von Bergen, Mell. Textilber, *4*, 23, 77, 123 (1923), *6*, 745 (1925), *7*, 451 (1926). The Melliand, *2*, 9, 186 (1930).
[3] Westbrooke, Text. Col., *51*, 583 (1929).
[4] Race, Rowe, Speakman, and Vickerstaff, J. Soc. Dyers & Col., *54*, 141, (1938).
[5] Race, Rowe and Speakman, J. Soc. Dyers & Col., *54*, 159 (1938).
[6] Race, Rowe and Speakman, J. Soc. Dyers & Col., *55*, 69 (1939).
[7] Race, Rowe and Speakman, J. Soc. Dyers & Col., *55*, 258 (1939).
[8] Race, Rowe and Speakman, B. P. 511, 688. August 23, 1939.
[9] Speakman, J. Text. Inst., *32*, T107, (1941).
[10] Speakman, Text. Recorder, *63*, 47 (1946).
[11] O'Day, Amer. Dyes. Rptr., *34*, P157, (1945).
[12] Smith and Harris, Rayon Text. Monthly, *17*, 795 (1936).
[13] McMahon and Speakman, Trans. Faraday Soc., *33*, 844 (1937).
See also New Zealand J. Sci. Techn. *20*B, 248 (1939); New Zealand J. Sci. Techn. *22*B, 235 (1941).
[14] Race, Rowe, and Speakman, J. Soc. Dyers & Col., *54*, 421 (1938).
[15] Townend, J. Soc. Dyers & Col., *61*, 144 (1945).
[16] Royer and Millson, Amer. Dyes. Rptr. *29*. P697 (1940).
[17] Royer, Millson and Stearns, Amer. Dyes. Rptr. *23*, P285 (1943).
[18] Geiger, Kobayashi, and Harris, Rsch. J. Nat'l Bur. Standards, *29*, 381 (1942).

Papers, Committees, Speakers and Judges Announced for Intersectional Contest

PATRICK J. KENNEDY, Chairman of the National Intersectional Contest Committee, has announced the following papers, committees, speakers and judges for the Intersectional Contest to be held in conjunction with the National Convention at Chicago on October 23, 24 and 25. It will be noted that the subjects selected are timely, very interesting and in a few cases might be considered unusual.

New York Section

Title of Paper

"Dyeing and Fastness Characteristics of Aqueous Chlorinated Wool".

Chairman of Contest Committee

Daniel P. Knowland, Geigy Company, Inc.

Contest Committee

Dr. Alfred L. Peiker, Calco Chemical Division, American Cyanamid Company.

Dr. Arthur E. Weber, National Aniline Division, Allied Chemical & Dye Corp.

Dr. Emery I. Valko, Drew Chemical Company.

Dr. Hugo Ehrhardt, Botany Mills, Inc.

Charles H. A. Schmitt, Sandoz Chemical Works, Inc.

James E. Flint, General Dyestuff Corp.

Edward D. Lind, Ciba Company, Inc.

William F. Brommelsiek, Forstmann Woolen Co.

Speaker

Dr. Alfred L. Peiker.

Judge

Emmett J. Driscoll, Turner-Halsey Co.

Rhode Island Section

Title of Paper

"The Influence of Electrical Charge in the Application of Dyestuffs".

Chairman of Contest Committee

Herman C. Allen, Sayles Finishing Plants, Inc.

Contest Committee

Harold B. Sturtevant, Hart Products Corp.

Prof. William W. Russell, Brown University.

Dr. W. George Parks, Rhode Island State College.

Raymond W .Jacoby, Ciba Company, Inc.

Herbert F. Kilguss, Apponaug Co.

William F. Huber, Rhode Island School of Design.

William M. Thornton, Wanskuck Co.

Gerald B. Stackpole, Cranston Print Works.

George H. Wood, Jr., Ex-officio, Apponaug Co.

Speaker

Raymond W. Jacoby.

Judge

Elliot Broadbent, Glenlyon Print Works.

Piedmont Section

Title of Paper

"A Study of Soils and Detergency".

Chairman of Contest Committee

Dr. R. E. Rupp, Pacific Mills.

Contest Committee

V. B. Holland, Cannon Mills Co.

Charles B. Ordway, Burlington Mills.

Speaker

V. B. Holland

Judge

J. B. Neely, Burlington Mills.

R. Hobart Souther, Proximity Print Works (Alternate)

Southeastern Section

Title of Paper

"Weather-Protective Treatments for Cotton Duck".

Chairman of Contest Committee

J. D. Dean, Southern Regional Research Laboratory, U. S. Dept. of Agriculture.

Contest Committee

Winston B. Strickland, Southern Regional Research Laboratory.

P. J. Fynn, Southern Regional Research Laboratory.

Jack E. Sands, Southern Regional Research Laboratory.

Robert O. Simmons, Pepperell Mfg. Co.

Dr. Howard M. Waddle, West Point Mfg. Co.

Miss Mary Anna Grimes, Texas Agricultural Experiment Station.

Speaker

P. J. Fynn.

Judge

Curt Mueller, Bibb Mfg. Co.

Mid-West Section

Title of Paper

"Application of Carboxy Methyl Cellulose to Wet Processing of Textiles".

Chairman of Contest Committee

Dr. Leonard J. Armstrong, Armour & Co.

Contest Committee

Leslie O. Meyer, Phoenix Dye Works.

Paul Soderdahl, Hart & Harrington, Inc.

Dr. Ben C. Sher.

Al. J. Feit, E. I. duPont de Nemours & Co., Inc.

Jerome Kritchevsky, Minol Laboratories.

Earl W. Scott, Western Felt Works.

Speaker

Dr. Ben C. Sher.

Judge

Joseph H. Jones, Phoenix Dye Works.

South Central Section

Title of Paper

"The Effect of Urea on Cellulose Textiles."

Chairman of Contest Committee

Dr. Raymond B. Seymour, University of Chatttanooga.

Contest Committee

Julius A. Crumley, Bryan Full Fashion Hosiery Mill.

Andrew J. Kelly, Burkhart-Schier Chemical Co.

William Agnew, Dixie Mercerizing Co.

Speaker

Dr. Raymond B. Seymour.

Judge

Alexander D. Campbell, Althouse Chemical Co.

Philadelphia Section

Title of Paper

"The Application of Chemical Controls to Acid Dyeing."

Chairman of Contest Committee

Richard B. Stehle, Allegheny Dye Works.

Contest Committee

Curt R. Baeringer, Eagle Dyeing and Finishing Co.

Elmer C. Bertolet, Laurel Soap Mfg. Co.

Felice J. De Maria, J. B. Stetson Co.

Harold L. De Turck, Berkshire Knitting Mills.

Dr. Edwin C. Dreby, Scholler Bros., Inc.

Wm. Ebersold, James Lees & Sons Co.

Arthur W. Etchells, Hellwig Dyeing Corp.

Walter F. Fancourt, III, W. F. Fancourt & Co.

Joseph E. Goodavage, Sharples Chemical Co.

Edwin J. Grajeck, Collins & Aikman Corp.

Dr. O. B. Hager, Alco Oil & Chemical Co.

Herbert C. Haller, Forstmann Woolen Co.

M. H. Klein, Sandoz Chemical Works, Inc.

Constantin J. Monego, Philadelphia Textile Institute.

Harry L. Morgan, James Lees & Sons Co.

Thomas J. Scanlon, Calco Chemical Division, American Cyanamid Co.

Dr. Robert J. Thomas, E. I. duPont de Nemours & Co., Inc.

Dr. Harold H. Tucker, Consultant.

Jackson A. Woodruff, American Viscose Corp.

Speaker

Richard B. Stehle.

Judge

Prof. Percival Theel, Philadelphia Textile Institute.

Northern New England Section

Title of Paper

"An Electrolytic Method for Stripping Colored Wool."

Chairman of Contest Committee

Kenneth R. Fox, President, Lowell Textile Institute.

Contest Committee

Edwin W. Adams, Pepperell Mfg. Co.

Tracy A. Adams, Barnes Textile Associates, Inc.

Lyman Billings, Socony Vacuum Oil Co., Inc.

Henry D. Evans, Pepperell Mfg. Co.

Ernest R. Kaswell, Fabric Research Labs., Inc.

Arthur C. Merrill, Jr., Lawrence Print Works, Inc.

Clarence L. Nutting, Arlington Mills.

Tom Peel, Pacific Mills.

Dr. Donald H. Powers, Monsanto Chemical Co.

Ridgley G. Shepherd, Assoc. Factory Mutual Insurance Co.

Thomas W. Shoesmith, Goodall-Sanford, Inc.

Prof. John H. Skinkle, Lowell Textile Institute.

Speaker

Ernest R. Kaswell.

Judge

Dr. David X. Kelin, Aspinook Corp.

CALENDAR

PHILADELPHIA SECTION
Meetings: September 26 (Kugler's, Philadelphia), November 8 (Silver Anniversary Meeting). January 16, 1948, February 27, April 9, May 21 (Bellevue-Stratford Hotel, Philadelphia).

NORTHERN NEW ENGLAND SECTION
Meetings: September 26, November 21.

SOUTH CENTRAL SECTION
Fall Outing, September 5 and 6 (Lookout Mountain Hotel).

PIEDMONT SECTION
Fall Meeting: October 4 (Hotel Charlotte, Charlotte, N. C.).

NEW YORK SECTION
Meetings: September 26, December 5 (Swiss Chalet, Rochelle Park, N. J.).

NATIONAL CONVENTION
October 23, 24, 25 (Congress Hotel, Chicago).

National Convention

•

Chicago October 23, 24, 25

•

Auspices of Mid-West Section

•

Headquarters: Congress Hotel

•

Watch future issues for more news of the Convention

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

47-34

Education: Columbia University, one year.
Experience: Laboratory asst., and operator of most machines in bleachery and dye house.
Age 35; married; references; prefers N. E. or N. Y.

47-35

Education: B.S. in Textile Chemistry, North Carolina State College, 1947.
Experience: Analytical chemist, construction and operation of water purification plants, pulp and paper manufacture including bleaching; Navy technician. Age 25; single; references.

Dr. Stiegler to Speak at Piedmont Meeting

DR. HAROLD W. STIEGLER, Director of Research, will discuss the research program and the progress which the AATCC is making in research at the annual meeting of the Piedmont Section to be held October 4th in Charlotte, North Carolina.

The nominating committee which will present its nominations for sectional officers at this meeting is composed of Leland Atkins, chairman, Sidney Cone and Henry Dixon.

—♦ ♦—

Annual Outing, Midwest Section

THE annual outing of the Midwest Section was held at Lake Lawn, Delavan, Wisconsin, June 21, 1947 and was attended by 152 members and guests.

The main feature was the golf tournament and many beautiful prizes were made available through the generous cooperation of our friends in the industry.

Golf Winners

Low Gross—Bob Anderson and Jim Morrison tied with a neat 78.

Third Low Gross—Frank Myers won with an 80.

Guest Winners

Low Gross—V. Snyder and C. Schussler tied with an 80.

Third Low Gross—Dick Andreae tallied an 82.

Baseball Game

This was a complete upset with the Suppliers trimming the Millmen 6 to 2 for the first win in the history of the section.

Barnyard Golf

Doubles—First—Klute & Dominico.
Second—Cools & Iverson.
Third—Mullins & Hoeft.
Singles—First—Dominico.
Second—Fay.
Third—Mayfield.

Ping Pong

Ray Haas walked away with all honors.

The Outing was a high success and our congratulations go to the committee headed by Norman Koehler.

Respectfully submitted,
GEORGE B. CHABOT, JR.
Secretary.

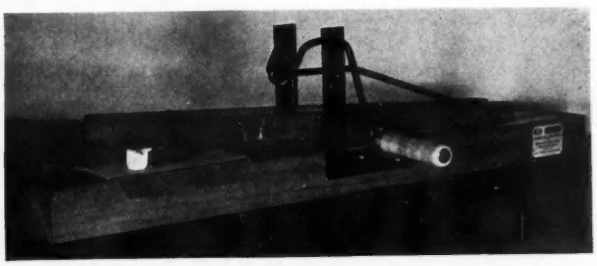
To Intensify Study of Aging of Textiles

THE Committee on Aging of Textiles plans to broaden its scope to include work on the deterioration of textile fibers exposed to light. In announcing this decision, J. D. Dean of the Southern Regional Research Laboratory, U. S. Department of Agriculture, and chairman of the Committee, pointed out that the two fields of investigation have much in common. At present, research on aging of textiles is being carried out in several laboratories, but no detailed account of the results has been made available as yet.

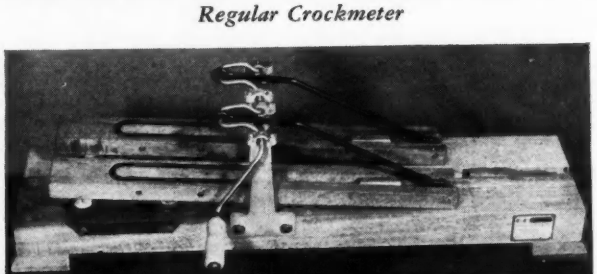
Crockmeters and Crockmeter Cloth

Revised Prices

Regular Crockmeter	$20.00
Regular Crockmeter (with automatic counter)	30.00
Duplex Crockmeter	50.00
Crockmeter Squares (500)	1.50
Crockmeter Cloth (96 x 100), by the yard	.75



Regular Crockmeter



Duplex Crockmeter

ABSTRACTS
FROM CONTEMPORARY JOURNALS

A Theoretical Discussion of Further Substitution of Disubstituted Naphthalenes. Part IV—A Comparison of the Sulphonation and Nitration of Polynitronaphthalenes, Naphthalene Polysulphonic Acids and Naphthalene Nitrosulphonic Acids

H. H. Hodgson and E. R. Ward, Journal of the Society of Dyers and Colourists, page 177, Vol. 63, No. 6, June, 1947.

This paper is summarized as follows:

It is found that at low temperatures the sulfonation and nitration of naphthalene, and the further sulfonation and nitration of its nitro-, sulfonic acid- and nitrosulfonic acid-derivatives, takes place in accordance with the theories advanced in Parts I, II and III of this series. Only at high temperatures and with particular compositions of the reaction medium (e.g. whether in sulfuric acid or oleum of various strengths) does sulfonation appear anomalous, although such anomalies have been resolved by the explanations advanced in the previous parts. The introduction into general use of the rules of Vesely and Jakes, as modified by the reasonance theory, in place of Armstrong and Wynne, therefore appears to be justified.

The Chemistry of Terylene

"Technologist", Textile Mercury and Argus, page 910, Vol. CXVI, No. 3038, June 27, 1947.

Terylene is the trade name of the new rayon discovered by chemists of the Calico Printers' Association and now being developed under the joint auspices of this company and Imperial Chemical Industries, Ltd.

Terylene is related to nylon in that it is a polyester which can be spun by the melt extrusion process developed for the manufacture of nylon fibers.

If two well chosen components are used for the manufacture of the polyester it is possible to produce very serviceable fibers. The two components of the polyester from which Terylene is made are terephthalic acid and ethylene glycol. These two components are heated to form a simple ester. This ester is capable of uniting with further molecules of terephthalic acid and ethylene glycol and the resulting more complex ester is yet again capable of uniting with more of the two components, thus producing a polyester having long-chain molecules. The polymerization is carried to a far stage so that the resulting polyesters do not melt below about 240° C. and they are insoluble in most organic solvents. A process of stretching or cold-drawing is employed.

Screen-Printing Plant Achieves Line Production

H. S. Knowlton, Textile World, page 106, Vol. 97, No. 5, May, 1947.

This is a report of the production methods at Riveredge Printers, Inc., Fall River, Mass., where production of approximately 12,000 yards per day is achieved on 50,000 square feet of floor space.

Industry's Debt to Science

J. Baddiley, Journal of the Society of Dyers and Colourists, page 206, Vol. 63, No. 7, July, 1947.

The British Chemical Society was founded in 1841 but only now has it found an opportunity for a fitting celebration of its centenary. The field of technology which the Society of Dyers and Colourists rgepresents impinges on the branch of science of which the Chemical Society is the focal point in England.

John Mercer receives special tribute in this article which traces the beginnings of a systematic chemical technology to his studies on the action of caustic soda on cellulose in 1844. Mercer was also the first to experiment with the use of sulfonated oils on textiles. Mercer, however, lived in advance of his time and industry was not equipped to follow his lead. The first commercial synthesis of an artificial dyestuff in 1856 by Perkin was the event which really changed the textile industry to a scientific basis of development. Eventually the dyestuff industry grew to enormous proportions and also started many new branches of industry based on organic chemical research.

Although the dyestuff industry was established in England by Perkin it was lost to Germany who founded the industry on a basis of research and invention. Thus by 1900 the dyestuff industry in Germany was in an unassailable position. The opportunity presented to British chemists by events in 1914 was seized upon and between the two wars the industry, by its inventive skill, was re-established in England.

Examples cited of other industries who profited by the research methods and production technique of the dyestuff industry include: pharmaceuticals, photographic materials, rayon, fertilizers, and synthetic polymers.

The Abbot-Cox Process as Applied to Cotton

T. Richardson and E. R. Wiltshire, Journal of the Society of Dyers and Colourists, page 224, Vol. 63, No. 7, July, 1947.

This paper is mainly concerned with the application, according to a modification of the Abbot-Cox process, of vat dyes to cotton in cheese form. The general method worked out is as follows:

The packages, previously wetted out, are pigmented in a solution containing the necessary quantity of dye and 5 g. Dispersol VI per l, Pigmentation is commenced at 30°-35° C. and the temperature raised gradually over 20 min. to 90° C. In the case of two-way circulating machines, circulation should be mainly outside to inside. After maintaining the temperature at 90° C. for 10 min., common salt or Glauber's salt in solution is introduced gradually until complete or nearly complete exhaustion of the pigment has been obtained. It is impossible to specify the exact amount of electrolyte required, as this will vary with the dye and the type of package; it can only be determined by noting the exhaustion under any particular set of conditions. The pigmentation bath is then run off and the packages rinsed; alternately, the bath is only partially run off, depending on the quantity of Dispersol VL it is desired to retain for reduction.

The dyebath is next made up to volume and adjusted to normal dyeing temperature, followed by addition of the quantity of caustic soda required for reduction, and, after circulation of this liquor for a few minutes, the required quantity of sodium hydrosulfite. With dyes which normally require an addition of common salt or Glauber's salt to the dyebath, the addition should be made along with the caustic soda before adding the sodium hydrosulfite. Reduction is carried out for the time appropriate for the dyes being processed.

The dyeing is oxidized either by a water rinse followed by oxidation with percarbonate, or, where necessary, by treatment immediately after dyeing with bichromate and acetic acid. Finally, soaping is carried out at the boil in the usual manner.

Integration of Sciences in Textile Research

S. JACK DAVIS
Chief Chemist, Research Division, Callaway Mills, LaGrange, Georgia

I WISH to speak to you tonight about a field in which I have been working for the last five or more years and to endeavor to point out to you the contribution, or possible contribution, which may be made to this field by the various sciences. This field is textile research, and the field of textile research as such is relatively new although it is concerned with an industry that is among our oldest.

Textiles to some may mean simply clothing, but the field is far greater than this restricted use. Textiles in the form of tents provide shelter from the elements, textiles in the form of conveyor belts provide means of transporting materials, textiles imbedded in rubber tires meet the requirements of flexible structural material, textiles wrapped around conducting wires provide satisfactory electrical insulation, textiles in the form of rugs afford resilient floor covering, textiles in the form of towels absorb water from the body, textiles combined with plastics in laminates make silent gears, and so on and on one might account for the engineering uses, as well as the decorative uses, of textiles. When one is confronted with such an extensive catalog of the end uses of textile materials, it is necessary to realize that these various end uses make widely varying demands upon the textile materials. As our knowledge of the fundamental properties of the textile material increases, we may confidently expect that the existing end uses will be more adequately served, and new ones discovered.

Fibers

The fundamental unit comprising a textile raw material is the fiber. Fibers may be long or short, they may be thick or thin, they may be strong or weak, and they may be stiff or they may be resilient. Fibers may be derived from a wide variety of natural sources or they may be manufactured by man, either by regenerating naturally occurring materials or by synthesis from simpler materials. Even in spite of fibers from glass, from naturally occurring asbestos, and from certain metals, by far the greatest volume of fibers in commercial use today are organic high polymers.

* Presented before the Society of Sigma Xi, Alabama Polytechnic Institute, April 23, 1947.

If we are to understand the best textile materials for a given end use, it is necessary that we have a fundamental understanding of the intrinsic building block of that material, namely the fiber. Here it is that the physicist and the chemist and the biologist take over and have a field day. In the background, of course, is the agriculturist and hovering above it all, like the specter of death, is the economist.

I would like to classify for you the types of fiber in a commercial use today. First of all, under the general classification of cellulosic fibers, is that grand old product of the South which has been called King Cotton. Flax and ramie are naturally occurring cellulosic fibers used in small volume. Also in this classification is the so-called synthetic, rayon. Viscose rayon is not a synthetic in the strict sense, since it depends upon a natural source of cellulose as raw material. Cuprammonium rayon is a similar material, differing only slightly from viscose in its physical and chemical properties and also being a regenerated cellulosic fiber.

The next class of fibers could be the cellulose derivatives. Of these, only cellulose acetate has reached any extensive commercial importance.

The next general classification would be the naturally occurring protein fibers, including wool and other hairs.

The next classification could be the regenerated protein fibers, known generically as the "Azlons". Although this class has not as yet been commercially important, very rapid progress has been made recently in the technology of these fibers. Fibers are made by dissolving the protein from natural sources and regenerating them in an acid bath. The type of fiber produced is dependent upon the source of the protein, and perhaps the most familiar to you are those fibers made from the casein of milk, sold commercially under the trade name of "Aralac". There are fibers also from soy bean protein and from peanut protein.

The next classification I would propose would be the pure synthetics. Under this classification would fall the fibers made from polyvinyl chloride-polyvinyl acetate copolymers and known commercially as "Vinyon", and of course the grand fiber recently glamourized, and justly so, by its manufacturers: nylon.

Finally, I would suggest a combined classification of the inorganic fibers. Those of commercial importance include those from asbestos, a mineral which is fibrous in character, "Fiberglas", a fiber drawn from molten glass, and metallic fibers, such as steel or aluminum.

Properties of Fibers

What do we need to know about fibers? From the physical point of view, we need to know something of their strengths per cross-section unit area, we need to know their elongations under loads, we need to know the recovery from load, we need to know whether they will flex or not, we need to know whether or not they will shrink with moisture, we need to know their dielectric constants, we need to know their efficiency as thermo-insulators, we need to know their average cross-section diameter, and we need to know the distribution of fiber length—to mention only a few of the more important physical properties. From the chemical point of view, we desire to know the behavior of these fibers with respect to acid or alkali, with respect to heat, light, or other deteriorating influences, with regard to their water absorbing or repelling properties, their property of absorbing dyestuffs, their behavior toward oxidants such as bleaching solution, the possibilities of such chemical reaction as esterification and etherification, and a host of other odds and ends. To the biologist, it is of interest to know the extent to which a given fiber supports or repels microbiological activity, such as mildew and other destructive micro-organisms.

There are borders between the various sciences in which tools from one or the other or both must be employed. As mentioned earlier, most of the commercial fibers now used are organic high polymers. In order to understand their physical properties, it is necessary to resort to an investigation of their physico-chemical properties. It is desirable to know the degree of polymerization; in order to estimate this, one resorts to the colloidal chemist's measurements, viscosity or osmotic pressure. It is desirable to have a

measure of the interchain bonding, say by hydrogen bonding, in which event it is necessary to resort to fundamental data from physical chemistry to calculate the attraction of the various chains in the polymer. It is furthermore desirable to have some idea of the relative crystalline and non-crystalline portion of the high polymer, in which case the tool of the X-ray technologist is applied to estimate this property. After the micro-biologist has established that a certain fiber will support micro-biological attack, it is necessary for the chemist, in cooperation with the micro-biologist, to develop suitable proofing agents to prevent such micro-biological activity. The chemist produces a color on a fiber and it is the job of the spectropist to analyze it. The physicist finds a fiber of peculiarly high dielectric constant and it is the job of the chemist to determine the cause. The chemist alters the fiber by certain reactions and it is the job of the microscopist to trace the effect on the physical appearance of the fiber.

But the integration extends even further than this. Even today, the largest volume of fibers in commercial use are of natural origin. The agriculturist contributes to the production of better natural fibers by proper selection of plant breeds, soil conditions, proper fertilization, and improved method of harvesting. For example, scientists at the Southern Regional Research Laboratory have found that tire cord manufactured from Wilds cotton is far superior in service tests to a similar cord manufactured from Stoneville 2B. Very unfortunately the meteorologist has not yet obtained control of the weather, although he has made contributions of vital nature to weather prediction. Those in animal husbandry have made significant contribution toward the production of better wool through breeding and nutritional guidance.

Yarns

Assuming that adequate knowledge of the properties of fibers from the physical and chemical standpoint are well known, *which is certainly not the case,* and that these properties may be controlled through the combined efforts of the agriculturist and the synthetic fiber manufacturer, how are these various qualities to be translated into an end product which is suitably adapted to the end use? This appears to be a job for the engineer. Textile manufacturing *is* an engineering proposition. The fiber is the raw material. It is the job of the textile engineer to take this mass of disorganized fibers and, by appropriate means, to organize them in positions essentially parallel to one another. The fibers thus aligned with respect to each other are anchored into place, so to speak, by twisting around each other, forming the fundamental product of any textile operation, namely the yarn.

As soon as the yarn is formed in the mill, it is necessary to re-submit the product to the physicist for evaluation. Once again, the stress-strain relationships of the yarn are of great importance, dependent intrinsically upon the stress-strain relationship of the component fibers but not in a direct relationship to those properties. The complications of fiber organization and of twist have been imposed. The tensile strength of the yarn is to be determined and again it is dependent upon the intrinsic strength of the component fiber, but is not a direct function of the strength of the fiber since such factors as twist and the coefficient of friction between the surfaces of the fibers again enter the picture. The behavior of the yarn with repeated bending, or flexing, is again related to the intrinsic fiber property, but not in direct relationship. The organization of the fibers within the yarn are subject to review by the microscopist, and often the chemist is asked to check the fiber content of blended yarns.

If the yarn so produced enters directly into the end use, very often the chemist is asked to cooperate with the engineer in improving the overall tensile strength of the yarn. Occasionally he is asked to alter the dielectric properties of the yarn by chemical treatment or by the addition of bonding materials such as the synthetic resins. He is asked to make the textile material compatible with the medium in which it is used, improved adhesion to rubber and to plastics or greater resistance to micro-biological attack and the like being required.

Fabrics

Assuming on the other hand, that the yarn is to enter a woven fabric, this is another engineering operation. By mechanical means, yarns are inserted alternately above and below other yarns to form the woven fabric so familiar to all.

This is not accomplished, however, by the textile engineer, or weaver, without relying on the chemist to supply sizing formulations which will afford smooth weaving. These sizing compositions appear to be perfect culture media for most of the micro-organisms which attack textiles and it is necessary for the chemist to cooperate with the micro-biologist in providing for this in the formulation by including suitable proofing agents.

Woven fabrics have physical properties which are peculiar to themselves. Once again it is necessary to rely on the physicist for evaluation. For example, fifty singles yarns lying side by side in a width of one inch might have a total strength of forty pounds; when woven into a fabric and tested again, one inch width of this material very likely will have a tensile strength of 50 or even 60 pounds. This additional strength, apparently drawn from thin air, appears to violate the laws of mechanics. It is necessary for the physicist, or the theoretical engineer, to realize that the loads are being distributed over very short lengths of the yarns involved by the presence of the cross members of the fabric with the result that more of the intrinsic strength of the component fibers is now being utilized than when each yarn was allowed to shift for itself.

If I may be allowed a digression at this point, this seems to illustrate to me the strength in organization which should be characteristic of any research group. Several members of the group pulling independently may indeed carry the load required, but when their efforts and their talents are coordinated and inter-related through proper methods of cooperation, the whole may possibly exceed the sum of the component parts.

The impact resistance, the bursting strength, the permeability of the fabric to air, and the thermal insulating qualities of the fabric, now become the province of the physicist for study. The chemist in turn may submit the fabric to various procedures and vitally alter the permeability to air, or the thermal insulating factor, or even the bursting strength. Furthermore, the chemist may bleach the fabric to produce a very acceptable white material or he may apply any of a multitude of colors which are available. In order to do these things, he must have some idea of the chemical composition of the component fibers, and in these instances such physical characteristics as the twist of the yarn or the closeness of the weave enter into the picture. He may apply coatings of rubber or plastics to the fabric and make it impermeable to air or water, he may apply proofing materials to make the fabric water-repelling, or he may confer the quality of mothproofness on the material. The microscopist, in return, can check the depth and uniformity of dyeing or may determine with accuracy the position of coating on the finished fabric.

If I should be asked what are the ideal qualifications of a scientist engaging in textile research, I believe that I would say that he should be an expert in one of the fields mentioned and that he must be aggressively cooperative. No one man can be an expert in all the phases involved in textile research; it is a rare organization where there is a collection of men whose combined knowledge covers the gamut of requirements. But if the group as a whole works together with enthusiasm and intelligent direction, there are few problems in the textile industry which cannot be improved by its attention.

• PATENT DIGEST •

Lubricating Cellulosic Yarns for preparing knitted goods—Fat emulsions A, 7, 01

U. S. Pat. 2,418,927
(Freund, April 15, 1947; application, June 3, 1943)

Yarn which is used for knitting sheer, full fashioned hosiery is generally subjected to a rough treatment. Natural silk has a natural protective coating of sericin, binding the single silk filaments. Synthetic yarns have to be lubricated before knitting. Protein sizes which are often supplied to nylon yarns are not suitable for cellulosic yarns. The lubricating or sizing agents, prepared according to the present invention, can be applied to different yarns, the sizes adhere well and do not gum the knitting needles. Such a size, being within the scope of the invention, is composed from different fats and oils which have a high melting point and a low iodine number. Hydrogenated vegetable and animal oils and fats therefore correspond best to these requirements. A self emulsifying mixture is, for instance, prepared from hydrogenated fat having a melting point of 60-63° CM, stearic acid, bees wax, oleic acid, solid sodium hydroxide and water. The size is applied at 40-60° C.

References cited by the Patent Office are amongst others: U. S. Pat. 2,297,135 (Am. Viscose Corp.): a lubricant for synthetic yarns consists of glycerol esters, fatty acid sugar esters, mixed with simple soaps. U. S. Pat. 2,308,355 (Baker Castor Oil, Colbeth): oleyl glyceride is recommended as a synthetic fiber lubricant.

Further References: U. S. Pat. 2,345,199 (Hodson Corp.): monoglycerides, for instance glycerin monoester of soy bean fatty acids, mixed with a triethanolamine soap can be used as a fiber lubricant; similar also Brit. P. 547,667 (Godings).

Starch—Homogenized Dispersions G, 1

U. S. Pat. 2,417,969
(Stein, Hall & Co., Caesar, Thompson, March 25, 1947; application, Dec. 1941)

A starch dispersion, used in many fields of textile industry, should have a suitable degree of homogeneity and the maximum possible degree of viscous stability as a function of temperature and time. Heretofore these properties have only been attained by appropriate chemical treatments, for instance with alkalies, acids or oxidizing agents. But these starches are also chemically changed (degraded or depolymerized). The so-called cold soluble starches, being generally not degraded as far as dextrine, have not been a success up to now as stated in the present patent according to which a cold water soluble starch, exhibiting a relatively low and stable viscosity, can be prepared. The specification refers first to a publication in *Journ. Phys. Chem.*, 1941, p. 45 (Caesar and Cushing). In brief, it is explained in this article that starch molecules occur in large aggregates, partly bound by primary valences in chain form, partly by secondary valences in a lateral arrangement. Breaking the primary valences and thus shortening the chains is termed as "depolymerisation" or "degeneration" . . . this reaction is the base of manufacturing dextrine. *Disrupting the secondary valences* without substantially attacking the primary valences is termed as "dissociation" or "disorganization." Thus the present invention aims at obtaining dissociation with a minmum of "depolymerzation." The starch aggregates are said to be of a new type, having properties similar to cellulose chains: the characteristics of this process can be found therein that a starch milk is pre-heated *about 10° F below* the gelatinization point and charged in this state and at this temperature (thus not yet in gel form) under high pressure through a square or knife-edged orifice into a vessel where this milk circulates until a slow and gradual gelatinization occurs. No heating at all or just a minimum of external heating is applied but the temperature increase is merely, or to the greatest part, due to the turbulence of the fast circulating liquid. This gelatinized starch is dried on a spray drier. The dry product has quite other properties than the common raw starch. The dispersions of the substance, prepared according to the new process, are very homogenous. The process is best illustrated by the diagram. The curves of pressure and temperature are characteristic for this procedure: first heating to a point below the gelatinization point (a), then allowing to warm up by circulation only (b) and finally increasing the pressure to a maximum (the curve beneath the temperature curve).

References: This process is quite different from the usual homogenizing method of a gelatinized starch in a colloid mill, a homogenizer or the like. It has to be emphasized that starch enters the homogenizer in a slurried state and that gelatinization occurs under specific circulating, self-warming conditions only. Treatments based on a mechanical treatment of the already gelatinized starch have repeatedly been described, for instance in French P. 799,035 (Seck). Ringenbach proposed in Brit. P. 465,301 to treat thin starch paste, thus a starch dispersion in a colloidal mill.

References cited by the Patent Office are amongst others:

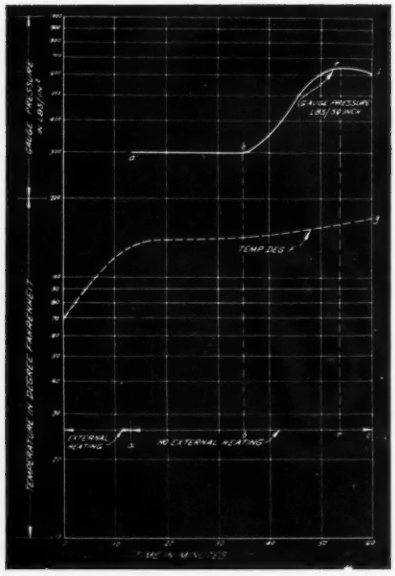
U. S. Pat. 2,313,574 (Eastman Kodak) describes a starch cooking device comprising a tank for mixing water and starch and pumping the slurry in a tank heated by a hot water coil.

U. S. Pat. 2,224,355 (Scholtens Chemische Fabrieken): relates to a starch mixing chamber having an inlet for *cold-swelling starch* and an annular surrounding inlet for the water, both components moving downwards while a vigorous mixing action takes place.

U. S. Pat. 2,216,179 (Stein Hall, Bauer): a treatment of starch consisting of slurrying it first and subjecting it thereupon to the action of steam.

PAUL WENGRAF

Starch—U. S. P. 2,417,969



Non Shrinking Wool—Alkylation process A, 2, 04

U. S. Pat. 2,418,071
(Textile Foundation, Milton Harris, Patterson, March 25, 1947; application, August, 1942)

The pre-amble of this specification refers to the former, rather unsuccessful attempts for making wool unshrinkable: by many of these treatments a reduction

in shrinkage could be attained only with leaving the fibers in a high reactive form which renders it more susceptible to damage. According to the present invention the wool material (also hair and the like) is first subjected to a reducing treatment, particularly by thioglycollic acid, H_2S,NaHS, or an alkyl mercaptan and thereupon to an alkylating operation, carried out preferably by methyl iodide. Other reagents used in this step are for instance ethyl bromide, diazomethane, CH_2N_2, or even arylating agents such as nitro fluoro benzene, $NO_2C_6H_4$-F. The reaction with methyl iodide may, for instance, be schematically illustrated as follows:

$$\underbrace{X\text{—}S\text{—}S\text{—}X'}_{\text{Wool molecule}} \rightarrow \underbrace{X\text{—}\begin{pmatrix} S & S \\ | & | \\ H & H \end{pmatrix}\text{—}X'}_{\text{disrupted S-S: sulfhydryl groups formed}} \rightarrow \underbrace{X\text{—}\begin{pmatrix} S & S \\ CH_3 & CH_3 \end{pmatrix}\text{—}X'}_{\text{alkylated}}$$

The fibers obtained in this way are stabilized and mothproof too. The reduction has to be carried out at a pH=9 (until at least one third of the disulfide linkages has been converted into sulfhydryl groups). The alkylation reaction requires a pH of 7-9.

For references see abstracts to U. S. Pat. 2,395,791 and U. S. Pat. 2,395,724, Brit. P. 572,041, in AMERICAN DYESTUFF REPORTER, 1946, p. 336-337.

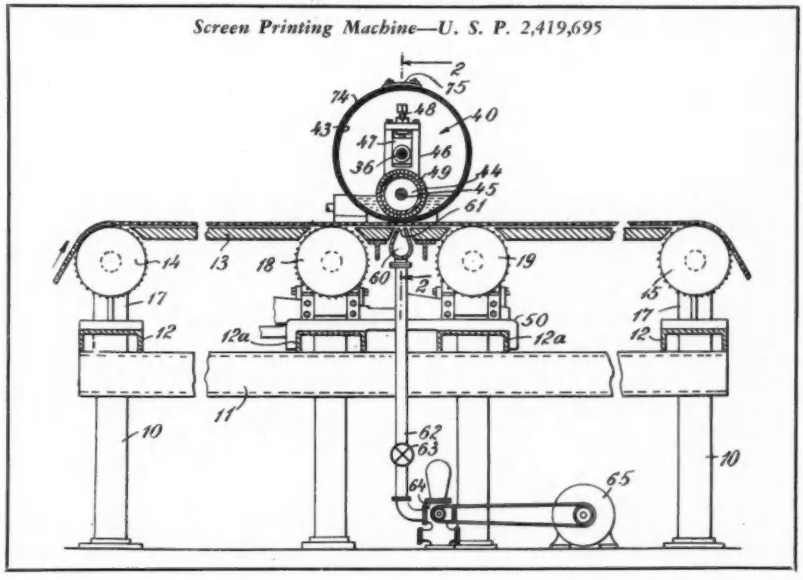
Screen Printing Machine for Pile Fabrics D, 3

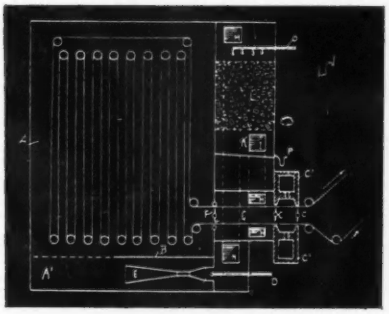
U. S. Pat. 2,419,695
(Mohawk Carpet Mills, Shuttleworth, Underwood, Jones; April 29, 1947; application, Oct. 26, 1943)

Pile fabrics in which the pile is made of tufts of different colors are known as "Axminster" or "Wilton" weaves. The present specification explains the difference between these two styles which are said to require large investments because of the high costs of dyeing yarns in skeins or in looms. The invention aims to provide an apparatus for producing pile fabrics in which the tuft yarns are colored by means of a printing operation. The printed imitations of the Axminster and Wilton styles are cheaper because of many reasons, also only the exposed length of each tuft has to be colored. The principle in the machine protected by the present patent is to force the dyestuff solution through the tufts downwards by a sucking action. The invention might better be understood by studying the accompanying drawing. The fabric is led over the top (13) of a table. Spike feed rolls are placed on both ends of the table (14, 15) to convey the fabrics from one side to the other. Near the center of the table two other similar rolls (18 and 19) extend through openings of the table to grasp the back side of the fabric. A drum (40) is suspended on a shaft (36). This drum is covered by a sheet of perforated metal, thus forming a rotatable screen. The shaft (36) is connected with another shaft (45) bearing an inner roll (44) which can be raised and lowered relatively to the inner surface of the drum (40). This roller (44) is covered with a layer of soft fabric (49). It has to squeeze the printing paste, contained in the lower part of the drum (40) and acts therefore like a doctor blade or a squeegee. A suction chamber (60) is mounted beneath the support (13) in an opening of the table. The chamber (60) is aligned with the axis of the drum (40) so that the suction acts on the fabric along a line immediately beneath the line of contact of the drum (40) and the fabric. In the use of this apparatus a stencil sheet (74) is wrapped about the drum and help in place by clamps (75). The color paste is added through a filler cap situated on one side of the drum. The color paste should be of such a consistency that it does not flow freely through the meshes of the screen but does only penetrate these apertures under a pressure exerted by the roll (44).

Reference: The principle of screens rotating over the fabrics to be printed while the color paste is squeezed from inside through these screens, bearing the pattern, has first been applied in a series of patents of the British Company Wheelwright (Brit. P. 416,373, 447,302, 448, 855).

Screen Printing Machine—U. S. P. 2,419,695





Rapid Ager—Sw. P. 242,143

Rapid Ager—filled with Oxygen-free steam D, 5

Swiss Patent 242,143
(Hoffmann, Sept. 2, 1946)

An ager having the purpose to save steam and to economize on this rather large consumption has been devised in the present patent. The principle is that oxygen is removed from the steam before it enters the steam chamber of an ager. Provided that a large portion of the oxygen is absorbed by some chemical compound the remaining steam can theoretically be circulated indefinitely within the ager while only a quantity transformed into condensate would have to be replaced. The present patent describes the following construction for this purpose: The steam chamber (A) contains near of the bottom a perforated second bottom (B). The lower compartment (A')

is filled with steam, coming from injector (E). At the entrance two steam heated jaws are placed. The channel through which the fabrics have to pass is partly closed by lids (C) and (F), held in their position by springs: a chamber (K) is placed in the front part of the ager. A reducing liquid, for instance a hydrosulfite solution, coming from pipe (O) flows through Raschig rings and fills the room (K). The steam has first to pass the chamber (G) between (F) and (C), then the Raschig-rings, impregnated with reducing liquid before it arrives to the injector (E). This is obviously the first attempt to remove air economically from the steam, filling a rapid ager and it might be interesting to observe the practical results.

TRADE NOTES • NEW PRODUCTS

• New Textile Building at Georgia Tech

Complete construction plans have been prepared for one of the world's most modern and up-to-date instructional and laboratory building for textile engineering at the Georgia School of Technology, it was announced recently by Herman A. Dickert, director of the A. French Textile School at the college.

The new building will occupy almost a whole city block and it is to be located at Hemphill Avenue and Third Street. Containing almost two acres of floor space, the functionally styled building will be two and three stories high, of reinforced concrete construction with brick and tile exterior walls. Plans call for an auditorium to seat 300; a three-story section with classrooms, offices, exhibit hall and laboratories; and a two-story section with classrooms, offices, exhibit hall and laboratories; and a two-story section with laboratories and mill rooms. A large number of textile engineers and executives have been interviewed and many textile mills and schools inspected by the architects, Bush-Brown, Gailey & Heffernan, of Atlanta, Ga., in the preparation of their designs and plans.

Textile equipment for the laboratories and mill rooms have been promised by the Textile Education Foundation of Georgia. If construction bids are satisfactory, work on the building will start in September so that it can be completed by the fall of 1948.

Main emphasis in the teaching and research work to be done in the new building is being placed in cotton, the primary fiber crop of Georgia and the South. Included among the many laboratories will be those for cotton classifying, cotton pickers, cotton cards, cotton spinning, and cotton looms.

But due to the many advances made in other fibers and because of their increasing importance to Georgia's industrial economy, there will also be laboratories devoted to synthetic yarns, wool and other fibers. To keep students and textile personnel acquainted with latest textile developments, plans include a special exhibition hall and an auditorium for lectures and motion pictures.

• $100,000.00 Building Gift

The Building Program of the Institute of Textile Technology at Charlottesville, Virginia, has been given substantial impetus as a result of a contribution from Callaway Institute, Inc. of LaGrange, Georgia, in the sum of $80,000.00 for the purpose of building and equipping a seminar or auditorium building to be located on the grounds of the Institute at Charlottesville and dedicated to the memory of the late Stuart W. Cramer. A contribution of $20,000.00 from Callaway Mills, LaGrange has been designated for use in the same project making a total of $100,000.00 now available for it.

The Institute of Textile Technology has also received from the Association of Cotton Textile Merchants of New York as indivlduals the funds with which to build and equip a technical library building on the grounds of the Institute, to be known as the Merchants Library.

It is anticipated that construction of both these buildings will commence in the immediate future.

The Engineering and Applications Building commenced by the Insttitue approximately a year ago is now complete and its staff is in the process of moving in. This building is three stories in height and occupies a position at the rear of the grounds of the Institute.

The Institute of Textile Technology is a membership corporation supported entirely by fees from member mills and numbers among its membership mills as far north as Waterville, Maine and as far south as Sylacauga, Alabama.

It is primarily a graduate school taking 15 candidates a year who already have their bachelor's degrees in the fields of science affecting textiles, from accredited institutions and carrying them through two years to the master's degree and four years to the doctor's degree.

• New Solvay Quarters

Solvay Sales Corporation, New York, has announced that the New Orleans and Houston branch offices have moved into new quarters in their respective cities. The New Orleans branch is now located at 1107 Pere Marquette Building, Baronne Street, New Orleans 12, Louisiana, and the Houston office of the firm is now established at 1313 City National Bank Building, 921 Main Street, Houston 2, Texas.

The telephone numbers of both branch offices remain unchanged.

• Glyco Price Reduction

A general price reduction on 50 products in its line of organic chemical derivatives, amounting in one product to as much as 30 per cent, was announced recently by Glyco Products Company, Inc., of Brooklyn, N. Y., and New Martinsville, W. Va. The price cuts average 20 per cent. Affected by the reductions are chemicals used by heavy industry, the rubber, paint, cosmetic and food industries.

• Identification of Resloom

A new system of identification to distinguish the different formulations of Resloom, was announced recently by Dr. D. H. Powers, director of the Textile Chemicals Department, Monsanto Chemical Company. Resloom is the established trade name for the company's series of melamine resins he stated. Each type of fabric requires a different member of the series.

This textile chemical was first introduced to make rayons crush-resistant.

Thus, Monsanto now has:

1. Resloom—Formula R for crush-resistant rayon.
2. Resloom—Formula W for washable wool.
3. Resloom—Formula C for wrinkle-resistant cotton.

• Bibliography and Index

Approximately 2500 reports of research on wartime technical problems sponsored by the Office of Scientific Research and Development are now available to the public, according to a *Bibliography and Index* published by the Office of Technical Services, Department of Commerce.

The items listed in the *Bibliography and Index* comprise all of the numbered reports published by OSRD between 1941 and 1945 which are no longer held confidential in the interests of military secur-

ity. Single copies of the reports have been placed on file with OTS which in turn sells photostat or microfilm copies of them to the public at approximate cost of reproduction.

Orders for the *Bibliography and Index* (PB-78000; *OSRD Reports—Bibliography and Index;* multilith copy, 75c; 109 pages) should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

• Two New LTI Scholarships

Two new scholarships will be provided next year and in subsequent years at the Lowell Textile Institute by the Chicopee Manufacturing Corporation, according to a joint announcement by President Kenneth R. Fox of the Institute and G. O. Lienhard, President of the Chicopee Manufacturing Corporation.

Chicopee Manufacturing Corporation, which has seven plants in six states in New England and the South, is engaged in the manufacture and development of cotton textile products. The Chicopee scholarships represent one phase of a program by this organization to provide better trained personnel for the textile industry by aiding textile education.

Junior and Senior students in Textile Engineering or Cotton Manufacturing who have completed their Freshman and Sophomore years at Lowell Textile Institute will be awarded these scholarships in the amounts of $600 for residents of Massachusetts and $700 for out-of-State residents.

According to the requirements set for the scholarships, the candidates must be native-born Americans, with potentialities for both leadership and scholarship. Preference will be given to native New Englanders and to those who agree to perform summer work in an approved cotton mill. The scholarships will be for two years.

In addition to scholarships, the Chicopee program of aid to textile schools includes guest lecturers from industry, student visits to plants of the company, and donations of equipment and supplies.

• To Evaluate Technical Documents

An invitation to technical societies, trade associations and other private industry groups to cooperate with the Office of Technical Services, Department of Commerce, in evaluating an estimated 500,000 technical documents revealing the details of Germany's wartime industrial technology was issued recently by John C. Green, OTS director.

The documents, all on microfilm reels and in German, have been collected over the past two years by American technical investigators in Germany under OTS sponsorship. The material was selected from the files of major German industrial plants, research laboratories, universities, and government offices because of its potential value to American industry. Included are 5,000,000 pages of highly technical data reproduced on 5,000 microfilm reels.

As rapidly as the microfilm reels are received, OTS catalogues them and publishes the titles in its weekly *Bibliography of Scientific and Industrial Reports*, available from the Superintendent of Documents for $10 a year.

OTS plans to compile and publish a compendium of German wartime technology based on these documents, Mr. Green explained. He said that OTS can do no more than coordinate the work involved in completing the compendium. However, if private industry, particularly trade associations and technical societies, will cooperate by furnishing the technical personnel to study and evaluate the documents, the job can be done.

Any trade association, technical society, firm, or individual interested in assisting in the compendium project is urged to write immediately to John C. Green, Director, Office of Technical Services, Washington 25, D. C., for further details. The letter should state the volunteer's field of interest and summarize his technical background for the work.

• Glyoxal in Production

Glyoxal—a new material for the textile industry—is now in production on a commercial scale. For 90 years it remained on laboratory shelves awaiting a process for commercial production. Although originally discovered by H. Debus in 1856, it has been generally produced by the oxidation of ethanol and acetaldehyde, but the commercial process developed by Carbide and Carbon Chemicals Corporation carries out the vapor phase oxidation of ethylene glycol. Pilot-plant quantities were first offered to industry in 1942 to supply small quantities for an anti-pellegra vitamin and large-scale production began on September 16, 1946, to satisfy the demand for the "Sanforset" process of shrinkproofing spun rayon developed by Cluett, Peabody and Company, Inc. As a result of the operation of these facilities, glyoxal is now marketed as a 30 per cent aqueous solution at a price of 17 cents per pound in tank car lots.

The largest present industrial demand for glyoxol is for the "Sanforset" treatment of spun rayon to "shrinkproof" or dimensionally stabilize the fabrics which was announced by Cluett, Peabody and Company, Inc., on March 28, 1947. By controlling the normal tendency of such fabrics to shrink when laundered, glyoxal is said to open up a greatly expanded future for the rayon industry. The glyoxal stabilization treatment produces an effect which is said to be permanent to repeated washings and the hand and texture of the fabric are not altered. It is an interesting fact that after treatment, viscose or cuprammonium rayon fibers are no longer soluble in cuprammonium solution and will not form cellulose xanthate. The tendency of the fabric to swell when wet is greatly reduced. It is stated that these fundamental changes in the chemical nature of rayon would seem to indicate that a new type of fiber is actually produced by the reaction between the glyoxal and the cellulose.

One of the chief advantages of the glyoxal treatment is that there is no resin coating formed on the surface of the fibers, according to the manufacturers. The treatment is applied without, it is claimed, producing any stiffening or harshening effect on the fabric, and any unreacted glyoxal on the surface is removed after curing by a soap wash. It is said that hydrolysis does not take place under storage conditions nor during washing operations, and no offensive odors develop in the treated fabric. The stabilized rayons are said to show no chlorine retention properties, so that white and pastel shades are safely treated. It is stated that, in many cases with vat dyes, an improvement in light and wash fastness is indicated. This process causes little or no change in shade on vat colors, but the proper selection of suitable direct colors is necessary.

Glyoxal stabilization can be combined, under the proper conditions, with other finishes such as water repellent treatments which require much the same mechanical handling, including a curing operation. When desired, a firm or even a crisp hand can also be produced by adding the proper stiffening agent to the treating solution.

Comparable uses on other textile fabrics include the application of glyoxal to cotton twill fabrics for increased wear resistance and to rayon pile fabrics for improving resistance to crushing or creasing. Glyoxal also reacts with polyethyleneamines to yield products which are static eliminators in synthetic fibers and hosiery operations. The possibility of extruding polyvinyl alcohol filaments through a glyoxal bath to yield a new synthetic fiber needs some attention. Incidentally, the same can be said of casein for a "Lanital" type fiber. Formaldehyde is being used at present in this application, but real possibilities for glyoxal are said to exist in this field.

Glyoxal contains the simplest chromophore group which makes possible the manufacture of insoluble dyestuffs by re-

action with aromatic diamines, aminophenols, hydrazines, and other amino and aminohydroxyl compounds. For instance, the dye intermediate quinoxaline is formed by reacting glyoxal with o-phenylenediamine. Indigo and substituted indigos can be synthesized from glyoxal sodium bisulfite and suitable aromatic amines. Early patents covered the synthesis of anthraquinone vat dyes and thiazole dyestuffs. Glyoxal can be considered for use in reducing vat and indigo dyes to their water-soluble leuco bases and as a reducing agent for stripping dyestuffs from fabrics in an analogous manner to the action of formaldehyde in the sulfoxylates.

It is claimed that glyoxal is highly reactive and is considered useful for most of the applications for formaldehyde. In many cases its relative non-volatility and mild odor are said to permit safer and more pleasant operating conditions than can be obtained when the more volatile formaldehyde is used. As the vapor pressure of the glyoxal hydrate from aqueous solution is less than 1 mm. at 100° C., glyoxal is of particular interest in chemical processes where this low volatility assures freedom from unpleasant vapors.

• Methylamine Prices Reduced

Reduction in the prices of its methylamines is announced by the Rohm & Haas Company, Philadelphia. The new price schedule is in keeping with the company's policy of passing along to its customers the benefits of reduced prices as sales volume permits, according to D. S. Frederick, vice president.

• Abstracts of Reports on File

Abstracts of over 500,000 scientific and industrial reports, which have been published in the weekly *Bibliography* issued by the Office of Technical Services of the United States Department of Commerce, are on file both by subject matter and numerically at the Consultants Bureau, 153 W. 33rd Street, New York City.

The file by subject eliminates the necessity of examining the 71 issues of the *Bibliography of Scientific and Industrial Reports* in order to determine what material pertinent to a particular subject is available from the Office of Technical Services. The numerical file permits the location of the abstract of any document if the PB number assigned to the document is known.

This file has been compiled by the Consultants Bureau for the convenience of trade associations participating in the organization's pro-rata translation program on captured documents in foreign languages. However, both the foreign-language and the English reports and patents which have been catalogued by the Office of Technical Services are included in the file.

Publications, industrial firms, librarians, professionals and students are permitted to use this file for their own research, without charge. Use of the files will be by appointment only.

• Custom House Guide

Announcing the publication of the 85th annual edition of the Custom House Guide, John F. Budd, editor and publisher, and a leading figure in foreign trade and international aviation circles, told interviewers that the reviving business of world trade was amply reflected in the pages of the newly-issued volume.

The 1,620 page Guide contains an alphabetical index of 30,000 commodities and their custom rates of duty (including Reciprocal Trade Agreement rates), as well as Customs regulations; the Internal Revenue Code; port activities, facilities, and charges; and a directory for shippers and those in allied trades. The General Information is said to place all sorts of necessary data at the fingertips of the importer and exporter.

To keep the Custom House Guide up-to-date, a monthly supplement, American Import & Export Bulletin, which covers the latest laws, regulations, decisions, rulings, import and export control requirements, trade agreements, general news, and business contact lists is published. In addition, a free Readers Information Service for the benefit of subscribers, is maintained.

Copies may be obtained from Custom House Guide, Box 7, Sta. P., Custom House, New York 4, N. Y. Price: $20.00 plus postage. (Includes monthly Bulletin).

• 1948 Spring Colors for Men's Hats

Seven new colors, consisting of three medium tones for town wear and four pastel shades for leisure wear, are presented in the 1948 Spring Card for Men's Felt Hat Bodies, just issued by The Textile Color Card Association to its members. These hat shades are shown in large swatches of fur felt, together with matching hat band.

In launching the new hat shades for Spring and Summer wear, the Association's color committee, representing leading firms in the men's hat industry, decided to present only medium and lighter tones, very new from the style angle and of high promotional value. It was felt that the colors in the Men's Hat Card for Fall 1947, which have continued acceptance, would answer any requirements for darker shades.

• NETF Scholarships Awarded

The New England Textile Foundation at 68 South Main Street, Providence, R. I. announces the award of 26 $500.00 freshman and 13 $500.00 sophomore scholarships at textile schools in New England.

The freshman scholarships were awarded after a competitive examination given by College Entrance Examination Board of Princeton, New Jersey, the scholarships going to the students with the highest average marks, and who met other requirements as evidenced by their high school records.

The sophomore scholarships were awarded to previous winners of freshman scholarships who obtained satisfactory marks in the 1946-1947 scholastic year.

The distribution of freshman scholarship winners is as follows: 12 from New York State, 6 from Massachusetts, 4 from Rhode Island, 2 from New Jersey, 1 from New Hampshire, and 1 from Vermont.

The distribution of sophomore scholarship winners is as follows: 3 from Massachusetts, 2 from New Jersey, 2 from Kansas, 2 from New York State, 2 from Pennsylvania, 1 from Ohio, and 1 from Maryland.

Of the freshman scholarships, 14 are at Lowell Textile Institute, 10 at Textile School of R. I. School of Design, 1 at New Bedford Textile Institute, and 1 at Bradford Durfee Technical Institute.

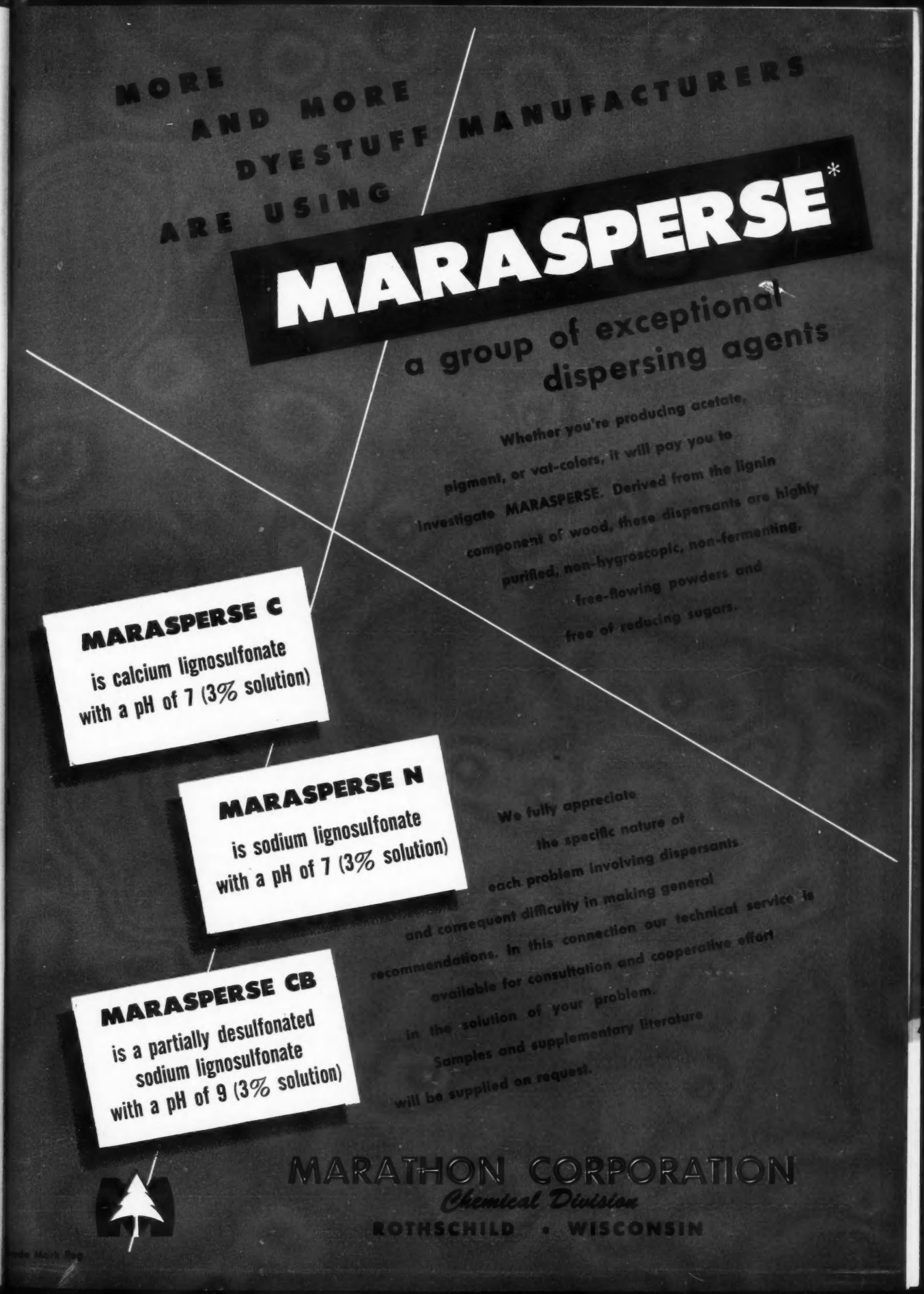
Of the sophomore scholarships, 10 are at Lowell Textile Institute and 3 at Textile School of R. I. School of Design.

• Veterans Textile Laboratory

The Veterans Administration has established a Laundry and Textile Laboratory at Bedford, Mass., Veterans Administration Hospital. This laboratory will exercise technical control over the 100 hospital laundries and 20 hospital dry cleaning plants now operated by the Veterans Administration throughout the country. This will be accomplished by testing and evaluating supplies, preparing specifications and technical bulletins, developing proper and improved cleaning practices, conservation of textiles and determining their suitability to resist cleaning operations and the distribution of a laundry test bundle for operation control purposes.

Hubert C. Normile is Technologist in charge of this laboratory. Mr. Normile was formerly, for twelve years, in charge of the Chemical and Plastics Section, Research and Development Division, Philadelphia Army Quartermaster Depot, concerned with development work on all types of textiles finishes and coatings.

This laboratory will later be located at the new Franklin Delano Roosevelt Hospital, now under construction at Peekskill, N. Y.


MORE AND MORE DYESTUFF MANUFACTURERS ARE USING
MARASPERSE*
a group of exceptional dispersing agents
Whether you're producing acetate, pigment, or vat-colors, it will pay you to investigate MARASPERSE. Derived from the lignin component of wood, these dispersants are highly purified, non-hygroscopic, non-fermenting, free-flowing powders and free of reducing sugars.
MARASPERSE C
is calcium lignosulfonate with a pH of 7 (3% solution)
MARASPERSE N
is sodium lignosulfonate with a pH of 7 (3% solution)
MARASPERSE CB
is a partially desulfonated sodium lignosulfonate with a pH of 9 (3% solution)
We fully appreciate the specific nature of each problem involving dispersants and consequent difficulty in making general recommendations. In this connection our technical service is available for consultation and cooperative effort in the solution of your problem.
Samples and supplementary literature will be supplied on request.
MARATHON CORPORATION
Chemical Division
ROTHSCHILD • WISCONSIN

Better slashing assures

BETTER DYEING AND FINISHING

For the mill, the ideal size is one that penetrates the yarn, increases tensile strength, provides needed stiffness, prevents shedding in the loom, and is available in any fluidity. But many sizes interfere with dyeing and finishing operations.

You can meet all mill requirements and yet assure yourself of easy desizing, if you specify Commonwealth's solubilized starch—

Gelaglaze

COMMONWEALTH COLOR & CHEMICAL CO.

MAIN OFFICE AND WORKS: Nevins, Butler and Baltic Streets, Brooklyn 17, N. Y.

PHILADELPHIA • CHICAGO • GLOVERSVILLE • MONTREAL

CHARI & RAM

(*Established* 1916)

Post Box No. 38,

MADURA, SOUTH INDIA

•

Leading Importers of Dyes and Chemicals

Branches and Agents all over India

•

Offers invited

from Manufacturers and Shippers

Cable Address:
"THAMARAI," Madura

Phone No. 69

QUALITY **RICHMOND** PRODUCTS

For Hosiery Dyeing Use—

DYETEX

for scouring

Removes all size and oil

SOLVOPEN "W" PASTE

for levelling

RONYL FINISH

gives firmer, more snag-proof stockings

Free samples gladly sent on request

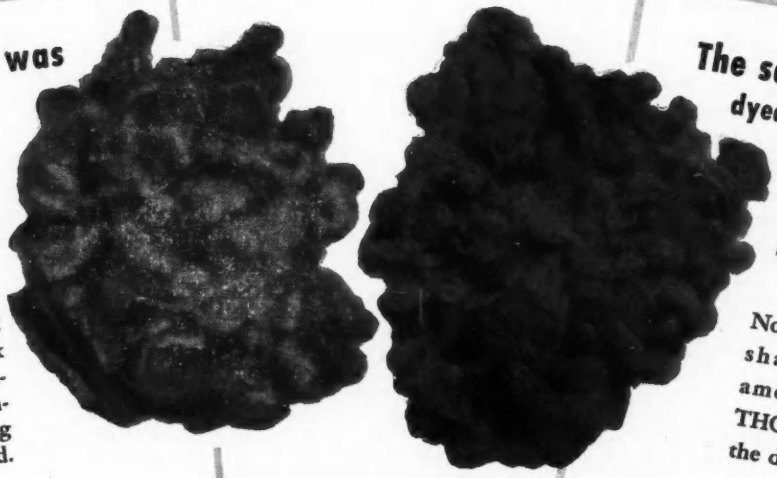
RICHMOND OIL, SOAP & CHEMICAL CO., Inc.

1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

TIPPY WOOL ?

This wool was dyed in the ordinary way

An ACID BLUE (Color Index No. 208) considered an uneven dyeing color, was used.



The same wool— dyed with the same color, but with the aid of ANTHOMINE

Note the uniform shade. A small amount of ANTHOMINE made the difference.

TRY ANTHOMINE !

(PATENT APPLIED FOR)

TO ELIMINATE UNEVEN DYEINGS

. . . QUICKER AND BETTER EXHAUSTION OF THE DYEBATH

. . . A SOFTER, MORE PLEASING "HAND"

. . . SUBSTANTIAL INCREASE IN COLOR YIELD

. . . NO SACRIFICE OF BRIGHTNESS OR FASTNESS

. . . PROCESSING TIME REDUCED

Although it has only recently been released for general sale, ANTHOMINE has been used and tested by many mills for more than a year. Colors and wool with tendencies toward uneven and tippy dyeing were especially selected for testing.

The results of actual mill use of ANTHOMINE in dyeing stock, yarn, or piece goods confirmed the hundreds of tests made in our laboratories.

Thus, ANTHOMINE is now offered to the trade as a tried and tested solution to the tippy wool dyeing problem with an assurance born of complete success in dyehouse.

Write for Technical Service Bulletin No. 203.100.1

Arkansas Co. INC.

Manufacturers of Industrial Chemicals for Over 40 Years

NEWARK, NEW JERSEY

G-4 gives you ...

SAFE MILDEW-PROOFING

Fabrics which come into close contact with the skin for long periods of time can be safely and dependably mildew-proofed with Givaudan's G-4*, efficient fungicidal and antiseptic agent.

G-4's mildew-proofing effect has been proved in use in all types of fabrics. It does not leach out with washing or weathering.

G-4 provides an economical way to fabric improvement—a little goes a long way. And your finishing methods remain unaltered, your fabrics stay soft, pliable, strong—unaffected in color or odor.

Effective mildew-proofing will greatly increase the sales appeal of your fabrics. Write today for full information.

*Dihydroxy Dichloro Diphenyl Methane

"BUY WISELY—BUY GIVAUDAN"

Givaudan-Delawanna INC.

Industrial Products Division

330 West 42nd Street, New York 18, N. Y.

Leatex

The name that means leadership in

CHEMICAL SPECIALTIES

for the

TEXTILE INDUSTRY

"Always Reliable"

LEATEX CHEMICAL COMPANY
2722 N. HANCOCK ST., PHILADELPHIA, PA.

DYESTUFFS and CHEMICALS

CHC TRADE MARK

DIRECT RECEIVERS and STOCKISTS

Inquiries Invited

Cables: Hardechem, New York
Phone: BOwling Green 9-4858-9

HARRIS CHEMICAL CORPORATION
82 BEAVER STREET, NEW YORK 5, N. Y.

"WAPACO" PRODUCTS
Serve the Textile Industry

WATSON-PARK CO. Wapaco Leads BOSTON, MASS.

DYESTUFFS
CHEMICALS
TEXTILE SOAPS
TEXTILE OILS
STRIPPING COMPOUNDS

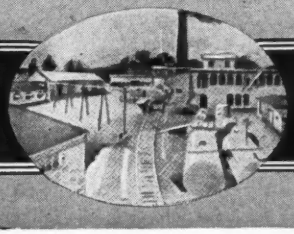
Liquid
HYDRALDEHYDE
THE NAME TO REMEMBER WHEN BUYING STRIPPING AGENTS

•

Outselling all others since its origin twenty years ago—it is *today* the woolen industry's *safe* stripper. Our constant efforts to eliminate free zinc in *liquid* HYDRALDEHYDE through modern manufacturing methods assure stronger fibres in reworked wool and piece goods.

Test *liquid* HYDRALDEHYDE against any other stripping agent offered—either powder or liquid— for a true comparison of the fibre's breaking strength.

•



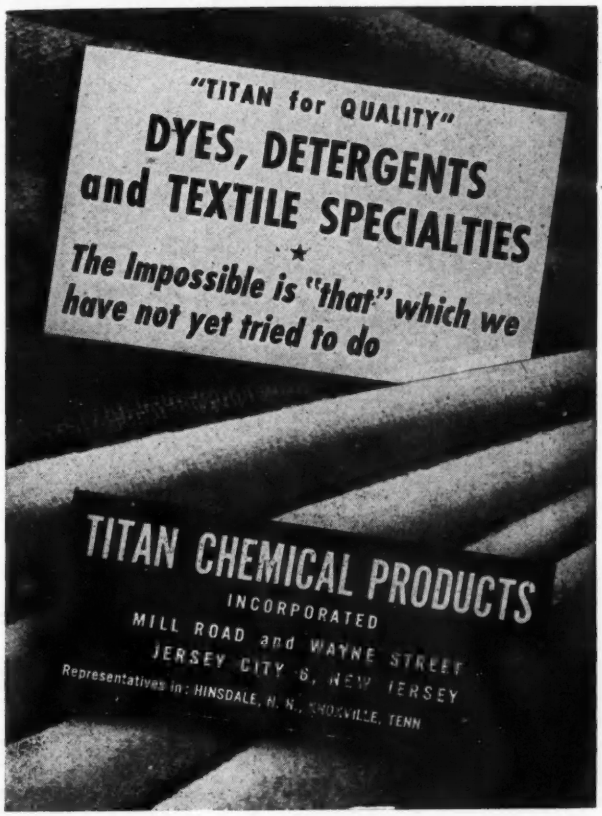
Factory
LOWELL JCT.
MASS.

WATSON-PARK COMPANY
261 FRANKLIN STREET · BOSTON, MASS.

QUALITY RICHMOND PRODUCTS

For Package Dyeing
use
ROSOPEN
Better Penetration
"No Suds"
ROSOPEN
Send for free sample

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

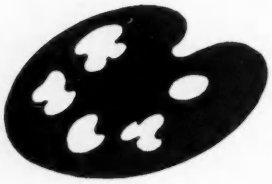

"TITAN for QUALITY"
DYES, DETERGENTS
and TEXTILE SPECIALTIES
The Impossible is "that" which we have not yet tried to do
TITAN CHEMICAL PRODUCTS
INCORPORATED
MILL ROAD and WAYNE STREET
JERSEY CITY 6, NEW JERSEY
Representatives in: HINSDALE, N. H., KNOXVILLE, TENN

DYESTUFFS

DIRECT - ACID - CHROME
FORMALDEHYDE - ACETATE

UNIFORMITY

With a background of many years of approval before the bar of public opinion.



PURITY OF COLOR

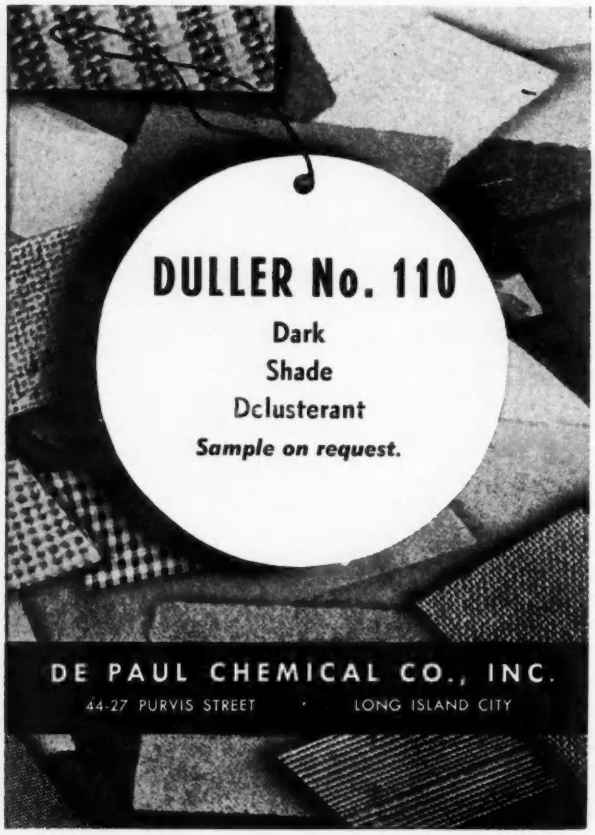
Custom made from best quality raw materials, producing products of high standing in the trade.

Stocks Carried by All Dyestuff Distributors in All Textile Centers

YOUNG ANILINE WORKS

OFFICE and FACTORY
2701-2733 Boston St., Baltimore, Md.

PATERSON OFFICE
50 E. 13th Street, Paterson, N. J.



IDAHO *Potato Starch*

"THE FINEST MADE"

MAGIC VALLEY PROCESSING COMPANY
OF IDAHO

•

ST. ANTHONY STARCH COMPANY, INC.
OF IDAHO

•

MENAN STARCH COMPANY, INC.
OF IDAHO

DISTRIBUTED BY
AMERICAN KEY PRODUCTS, INC.
15 PARK ROW · NEW YORK 7, N. Y.

Manufacturers of

ANILINE -- ALIZARINE -- CHROME

and

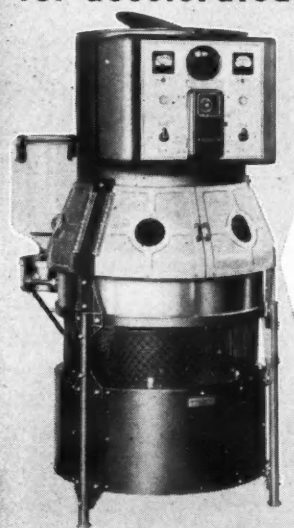
ACETATE DYESTUFFS

FUGITIVE WOOL TINTS
FINE ORGANIC PIGMENTS
TANNIC ACID and CHEMICALS

Our laboratories are always at your service

ZINSSER & COMPANY, Inc.
ESTABLISHED 1807
Manufacturing Chemists
HASTINGS-ON-HUDSON NEW YORK

FADE-OMETER
for accelerated color fading



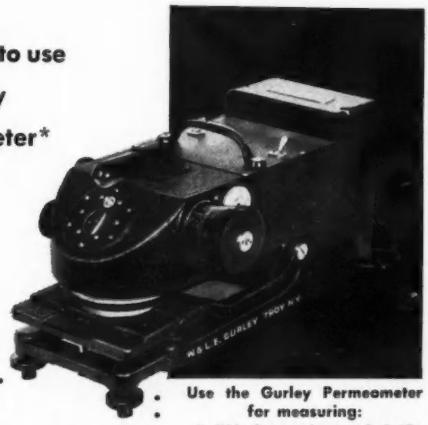
• Originated and made solely by Atlas. Used all over the world and accepted as the standard color testing machine by the textile industry for over a quarter of a century.

Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature automatically controlled. No loss of light intensity of arc during life of machine.

ATLAS ELECTRIC DEVICES CO., 361 W. Superior Street, Chicago, Ill.

ATLAS-OMETERS
WEATHER-OMETER ★ LAUNDER-OMETER ★ FADE-OMETER

Ten ways to use the Gurley Permeometer*



Here's the versatile instrument for quickly and accurately measuring air permeability of fabrics which permit passage of from 1 to 400 cubic feet of air per square foot area at a pressure drop of 0.5" of water. Write for Bulletin No. 1600. W. & L. E. Gurley, 512 Fulton, Troy, N. Y.

GURLEY
Scientific Instrument Makers
Since 1845

*Conforms to ASTM "Tent. Meth. of Testing for Air Permeability of Text. Fabrics" D737-43T.

Use the Gurley Permeometer for measuring:

1. *Wind-proofness* of cloth.
2. *Quality* of filter cloth.
3. *Use requirement* of cloth intended to resist or pass air.
4. *Water-resistant* properties.
5. *Coolness* or *warmth* of clothing material.
6. *Construction* of cloth.
7. *Penetration* into cloth of various coatings.
8. *Retention of fillers, starch and sizing* in cloth after laundering or cleaning.
9. *Compactness, nap* or *fiber arrangement* in cloth after fulling, washing, sizing or other treatments.
10. *Amount of wear* after abrasion tests.

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $7.50 per column inch or less per insertion.

CONFIDENTIAL EMPLOYMENT SERVICE—For Dyers, Chemists, Colorists, Managers, Superintendents and others seeking positions and for employers seeking men. Many positions paying attractive salaries, open for capable men. Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass. Over 45 years in business.

POSITION WANTED: TEXTILE CHEMIST AND COLORIST, desires position with progressive company interested in or associated with resin-bonded pigment printing and padding, resin finishes, or continuous dyeing systems. Background and past experience includes practical and theoretical approaches to textile coloration and finishing methods. Presently employed in charge of Textile Laboratory intimately associated with application and research relative to resin bonded pigments and finishing systems. Write Box 285.

WANTED—Experienced narrow fabrics finisher. Must be an organizer and sound technician, familiar with all phases of finishing. Write Box No. 278 giving full particulars of education and previous working experience.

WANTED BY CHEMICAL MANUFACTURER AND DISTRIBUTOR: Chemist with knowledge of dyestuffs, textile auxiliaries and resins to direct laboratory and render some technical sales service. Plant located in central New England. This is an unusual opportunity for the right man. Write Box 281.

POSITION WANTED—Textile Chemist-Colorist, age 30, graduate Textile School, experienced with all classes of dyestuffs. Desires laboratory position with dyestuff firm or dyehouse in Metropolitan area or New Jersey. Write Box 289.

WANTED—
ANY QUANTITIES
DIRECT COLORS
CONGO RED
DIRECT RED
BENZOPURPURINE
or Substitutes.
Submit quotations.
Box P.C.S. 147 Fourth Avenue
New York 3, N. Y.

WANTED—
DYES OF ALL TYPES. SPOT AND FUTURES.
WILL BUY LARGE QUANTITIES.
WRITE BOX 296

3 EXCEPTIONAL
SALES REPRESENTATIVE
POSITIONS
NEW ENGLAND * * MIDDLE ATLANTIC
SOUTH

A nationwide chemical manufacturer has open three active territories for qualified men of high sales ability. Only three positions are open, but each commands good salary and commissions. Applicants must be thoroughly familiar with the textile industry, have proved sales ability, technical education, and preferably be between the ages of 30-40. Write fully stating education, experience and details you consider pertinent. This is a remarkable sales opportunity so do not delay. Write Box 290.

WANTED—TEXTILE CHEMIST, young man preferred; textile school graduate, with broad knowledge of all types dyestuffs; thoroughly experienced in dyeing and printing on all fibers; someone with laboratory background who can work independently in dyestuff application laboratory, New York Metropolitan Area. State age, experience, salary. Write Box 295.

WANTED—Chemist in charge laboratory control and development, with plant experience. Attractive, permanent position with large reputable New York City Jig Dye Plant. State full details in first letter. Write Box 294.

WANTED——Experienced jig dyer, acetate rayon and vats. Large New York City company of high repute. State experience, references, all details. Attractive salary. Permanent position. Our employees know of this advertisement. Write Box 293.

POSITION WANTED—Textile Chemicals, Research, Development or Production. Experienced research director with excellent record of accomplishment and wide experience in textile finishes, synthetic organics, viscose products, printing, starches, proteins, and plastics available for position in technical or research management or as a consultant. Write Box 292.

WANTED—Chemist; Ph.D. with practical experience in textile field for employment in laboratory located in the South doing development work connected with Southern textile manufacturing and finishing plant. Please give all information in first letter including education, experience, age, whether married and expected salary. Write Box 291.

DYESTUFFS WANTED—Will pay 50 to 100% above manufacturers schedule for Direct Black c.i. 581, Malachite Green, Metanil Yellow, Diazo Black BH, Erie Red 4B, Congo Red, Indigosol Blue O4B and others. Write Box 297.

DYESTUFFS

•

SPECIALTIES

BICK & CO., Inc.
Manufacturing Chemists
Reading, Pa. Charlotte, N. C.

Complete *Your* reduction-picture

with

VIRGINIA "HYDRO" and the VIRGINIA "HYDROMISER"

The Hydromiser—exclusive with "Virginia"—was developed to feed "Virginia" Sodium Hydrosulphite *automatically* into the dyebath. It insures uniformity through accurately controlled flow . . . one pound to 200 pounds per hour. Cost-conscious finishers report 10 to 15 per cent savings in $Na_2S_2O_4$ and a marked reduction of rejects in continuous dye operation. If your dye operation is continuous, you should get full information about the Hydromiser. VIRGINIA SMELTING COMPANY, West Norfolk, Virginia. *Established 1898.*

SULFUR DIOXIDE • SODIUM HYDROSULPHITE

VIRGINIA *Chemicals*

WEST NORFOLK • NEW YORK • BOSTON • DETROIT

COTTON: In the kier, Pine Solvent XX brings the liquor in contact with every fiber, leaves uniform bottoms that dye and finish more evenly. Boiling time is cut. Fibers are softer, fuller, more resistant to age-discoloration.

WOOL: Pine Solvent XX is valuable in raw-wool scouring . . . irreplaceable in fulling. From the raw stock it produces clean, soft, really white wool in prime condition for storage or further processing. In the fulling mill, it cuts time as much as 30% . . . costs no more . . . helps you meet contract delivery dates on time.

RAYON: In boiling off, Pine Solvent XX rapidly emulsifies gelatinous materials . . . is safe for the most delicate fabrics. Used in dyeing, it makes the fabrics wet out and sink quickly.

DYEING: Pine Solvent XX makes dye liquor penetrate the hardest fibers and heaviest seams. It gives an even, level deposit of dyestuff of uniform depth throughout every fiber. Loose dyestuff and impurities are suspended for washing out completely.

PRINTING: In printing paste, Pine Solvent XX wets pigments thoroughly, disperses them evenly, and holds them in suspension without agglomeration until the design is on the fabric. Designs are sharp, colors bright and clear, no specks are formed.

CUT TIME AND COST—IMPROVE RESULTS IN ALL WET PROCESSING WITH BURK-SCHIER PINE SOLVENT XX

Burk-Schier Pine Solvent XX Reduces Surface and Interfacial Tensions . . . Wets, Penetrates, Suspends, Disperses . . . Aids Detergents and Dyes. A Little Does a Lot and Does It Well.

SCOURING WETTING PINE-SOLVENT BLEACHING DYEING

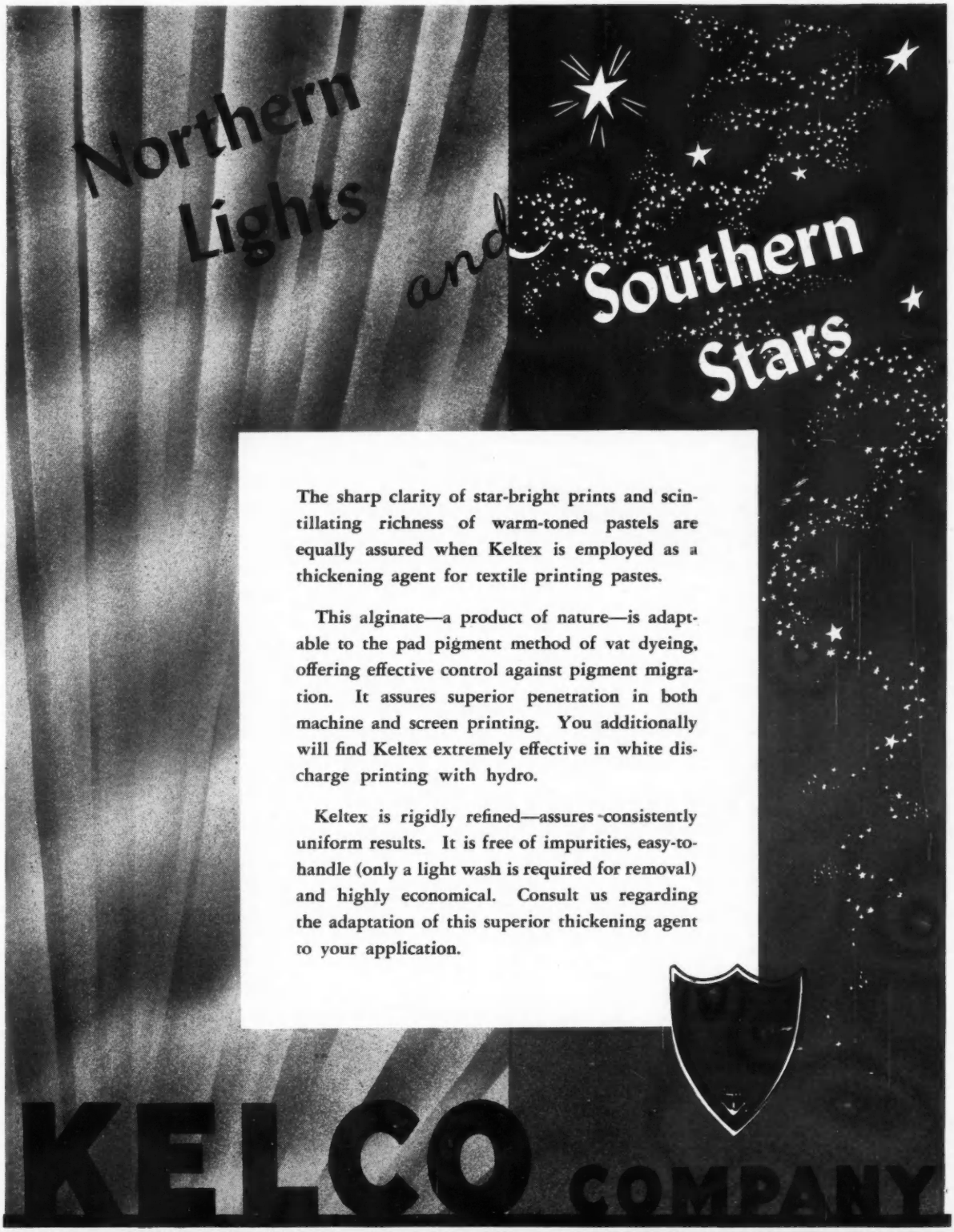
BURKART-SCHIER CHEMICAL CO.

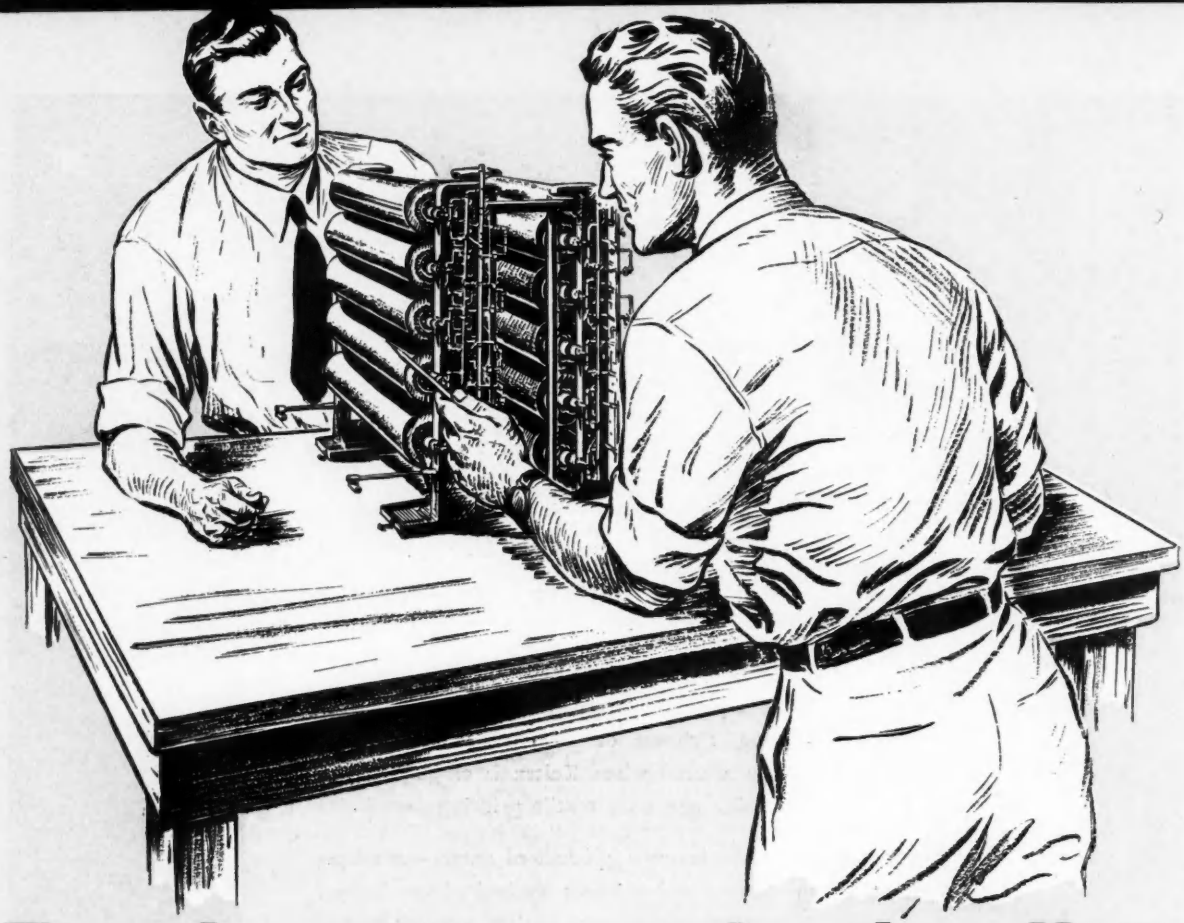
BURK-SCHIER CHATTANOOGA, TENNESSEE BURK-SCHIER

PENETRANTS • SOFTENERS • SOLUBLE OILS FINISHES

INDEX TO ADVERTISERS

Althouse Chemical Co.	Second Cover
Amalgamated Chemical Corp.	
American Aniline Products Inc.	XVIII
American Cyanamid Co. (Ind. Chem. Div.)	Back Cover
American Dyewood Company	
American Key Products, Inc.	XXXIV
Anders Chemical Corp.	
Arkansas Company, Inc.	XXXI
Armour and Co.	
Arnold, Hoffman & Co., Inc.	
Atlantic Chemical Co., Inc.	
Atlas Electric Devices Co.	XXXV
Becco Sales Corp.	XXVIII
Bhavanidas Gangadas & Co.	
Bick & Co., Inc.	XXXVII
Blickman, Inc., S.	
Burkart-Schier Chemical Co.	XXXVIII
Butterworth Sons Co., H. W.	XL
Calco Chemical Division, American Cyanamid Co.	XIII
Calgon, Inc.	
Campbell & Co., Inc., John	XIV
Carbic Color & Chemical Co., Inc.	XXVI
Carbide & Carbon Chemicals Corp.	
Chari & Ram	XXX
Ciba Company, Inc.	
Colgate-Palmolive-Peet Co.	
Commonwealth Color & Chemical Co.	XXX
De Paul Chemical Co., Inc.	XXXIV
Dewey and Almy Co.	
Drew & Co., E. F.	XXIV
Du Pont de Nemours Co., E. I. Dyestuff Division	Front Cover
Emery Industries, Inc.	VI
Fallek Products Co., Inc.	VIII
Fancourt & Co., W. F.	X
Geigy Company, Inc.	
General Chemical Co.	VII
General Dyestuff Corp.	III
Girdler Corp., The	
Givaudan-Delawanna, Inc.	XXXII
Grinnell Co., Inc.	
Gurley, W. & L. E.	XXXV
Hardesty Co., W. C.	
Harris Chemical Corp.	XXXII
Hart Products Corp.	
Heyden Chemical Corp.	
Hooker Electrochemical Co.	XX
Interchemical Corp., Textile Colors Div.	XV, XVI
International Salt Co., Inc.	XXII
Kali Manufacturing Co.	
Kelco Co.	XXXIX
Laurel Soap Co.	
Leatex Chemical Co.	XXXII
Leeds & Northrup	
Maher Color & Chemical Co.	
Marathon Corp.	XXIX
Mathieson Alkali Works, Inc.	XIX
Maywood Chemical Works	IV
Monsanto Chemical Co.	XXIII
Myles Salt Co., Ltd.	
National Aniline Division, Allied Chemical & Dye Corp.	V
National Carbon Co., Inc.	
National Starch Products, Inc.	
Nopco Chemical Co.	
Nova Chemical Corp.	
Nuodex Products Co., Inc.	
Nyanza Color & Chemical Co., Inc.	XII
Onyx Oil & Chemical Co.	IX
Oronite Chemical Co.	
Pabst Sales Company	
Perkins & Sons, Inc., B. F.	
Philadelphia Quartz Co.	
Procter & Gamble	
Proctor & Schwartz, Inc.	
Refined Products Corp.	XXV
Richmond Oil, Soap & Chemical Co., Inc.	XXX, XXXIII
Riggs & Lombard, Inc.	
Rohm & Haas Co.	
Royce Chemical Co.	
Rumford Chemical Works	
Sandoz Chemical Works	
Scholler Bros., Inc.	Third Cover
Sharples Chemicals, Inc.	
Smith, Drum & Co.	
Solvay Sales Corp.	XI
Standard Brands, Inc.	
Standard Chemical Products, Inc.	
Standard Oil Co. of N. J.	
Stein Hall & Co., Inc.	
Tennessee Eastman Corp.	
Titan Chemical Products, Inc.	XXXIII
Union Carbide & Carbon Corp.	
United Chemical Prod. Co.	
Van Vlaanderen Machine Co.	XVII
Virginia Smelting Co.	XXXVII
Wallerstein Co., Inc.	XXI
Warwick Chemical Co.	
Watson-Park Company	XXXIII
Wolf & Co., Jacques	
Young Aniline Works	XXXIV
Young Co., J. S.	
Zinsser & Co., Inc.	XXXV


Northern Lights and Southern Stars
The sharp clarity of star-bright prints and scintillating richness of warm-toned pastels are equally assured when Keltex is employed as a thickening agent for textile printing pastes.
This alginate—a product of nature—is adaptable to the pad pigment method of vat dyeing, offering effective control against pigment migration. It assures superior penetration in both machine and screen printing. You additionally will find Keltex extremely effective in white discharge printing with hydro.
Keltex is rigidly refined—assures consistently uniform results. It is free of impurities, easy-to-handle (only a light wash is required for removal) and highly economical. Consult us regarding the adaptation of this superior thickening agent to your application.
KELCO COMPANY
20 N. Wacker Drive
CHICAGO—6
31 Nassau Street
NEW YORK—5
530 W. Sixth Street
LOS ANGELES—14
Cable Address: KELCOALGIN—New York



Tough on our production line —but fine for yours

We can't keep our engineers out of the laboratory. They studied this cylinder drying machine and said: "Let's try a chain drive"—tough on our production line but fine for yours. The results in quieter operation and higher speeds are a matter of record. Individual stacks can be driven by individual motors, resulting in more accurate control of tensions between dry cans.

There's no "dead wood" in the Butterworth line. Single machine or complete range, Butterworth equipment is designed to give increased yardages at lower cost.

Butterworth—and only Butterworth—builds all of the machines you need in the wet end of textile finishing—bleaching, boiling-out, drying, calendering and dyeing. If you want our engineers to study your production line and suggest where modern machines will give you better production, write us today.

Butterworth

H. W. BUTTERWORTH & SONS COMPANY, Philadelphia 25, Pa.

TEXTILE FINISHING MACHINERY COMPANY DIVISION, Providence, R. I. - 1211 Johnston Bldg., Charlotte, N. C. - W. J. Westaway Co., Hamilton, Ont. ARGENTINA: Storer & Cia., Buenos Aires - AUSTRALIA: Noel P. Hunt & Co., Ltd., Melbourne - BELGIAN CONGO: Paul Pflieger & Co. - BOLIVIA: Schneiter & Cia., Ltda., La Paz - BRAZIL: Cia. Industria e Commercia, Glossop, Sao Paulo e Rio de Janeiro - CHILE: Schneiter & Cia., Ltda., Santiago - COLOMBIA: C. E. Halaby & Co., Medellin - CUBA: Thos. F. Turrull, Havana - ECUADOR: Richard O. Custer, S. A., Quito - FRANCE: Georges Campin, Le Perreux, Seine; Rene Campin, Sceaux, Seine - MEXICO: I. Slobotzky, Mexico, D. F. - MIDDLE EAST: Arlind Corporation - NORWAY: Dr. Ing. Otto Falkenberg, Oslo - PERU: Custer & Thommen, Lima - SOUTH AFRICA: Texmaco, Johannesburg - SWEDEN: Elof Hansson, Goteborg - URUGUAY: Storer & Cia., Ltda., Montevideo - VENEZUELA: Herbert Zander & Co., Caracas.

. . . they're finished with

DuraBeau
Reg. U. S. A. and Canada
TEXTILE FINISHES

Bright and value-wise, she knows what she wants in her hosiery: that appealing smoky-dull sheerness, long wear, increased snag resistance, spot repellency and LASTING BEAUTY

All these qualities are sealed-in by *DuraBeau* Finish, which imparts the "film of Protection and Beauty."

SCHOLLER BROS., INC.

Mfrs. of Textile Soaps, Softeners, Oils, Finishes • Collins & Westmoreland Sts., Phila. 34, Pa. • St. Catharines, Ont., Can.

GREENVILLE PUBLIC LIBRARY
DO NOT CIRCULATE SEP 15

THIS AERO BRAND STEARATES

STORY SPEAKS FOR ITSELF!

AERO* BRAND STEARATES . . . Calcium . . . Zinc . . . Aluminum . . . Magnesium . . . are products of the finest manufacturing facilities of their kind. The famous AERO BRAND seal on your stearate supplies means a fine, fluffy texture, uniformity and other recognized superior processing characteristics contributing basic advantages to the efficiency and economy of your operations. For product quality . . . for service . . . for the all-around dependability on which economical operations rely . . . it's CYANAMID AERO BRAND STEARATES.

CYANAMID'S MODERN FACILITIES BECOME YOUR DEPENDABLE SOURCE OF SUPPLY WHEN YOU SPECIFY . . .

AERO BRAND STEARATES

Industrial Chemicals Division

AMERICAN CYANAMID COMPANY

30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.

*Trade Mark